THE REFINER AND NATURAL GASOLINE MANUFACTURER

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Study is made of viscosities of fuel oil coming from Panuco Crude

More effects of cooling systems in checking evaporation losses

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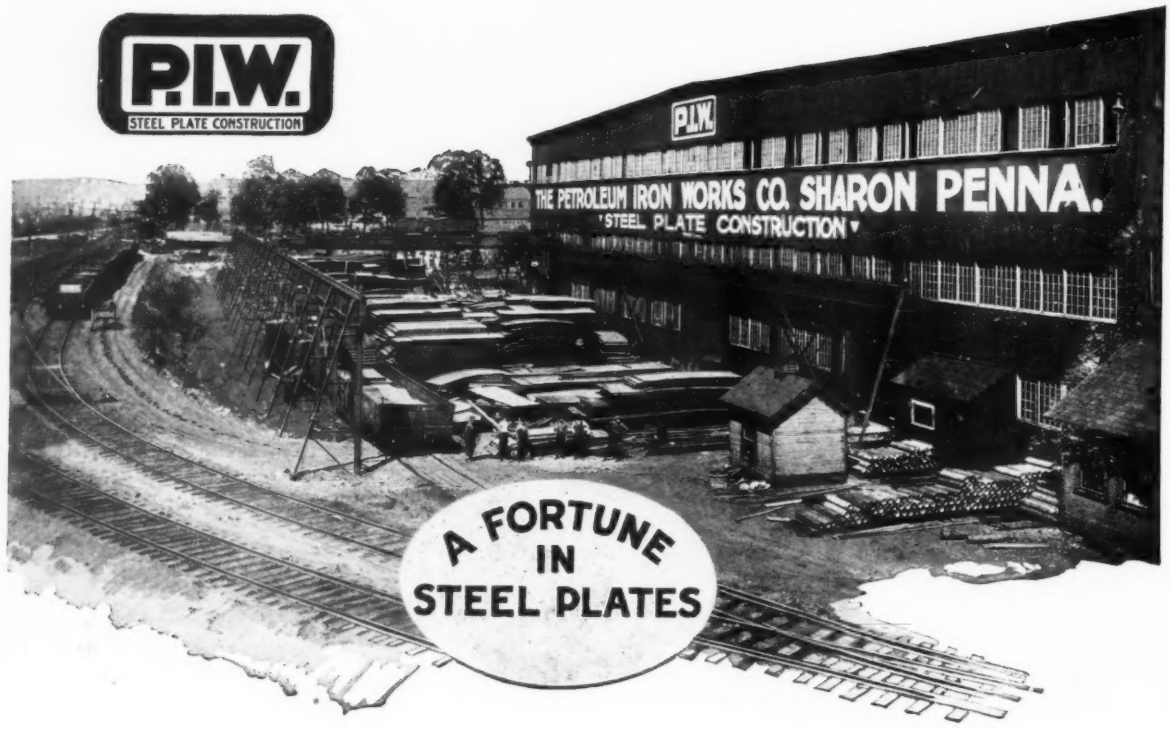

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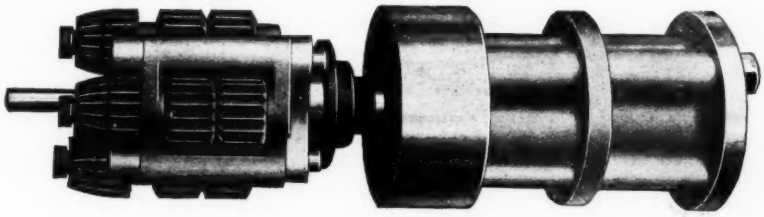

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R. L. DUDLEY..Manager and Editor

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No Need for Additional Gasoline Stocks

Supply on hand now is sufficient reserve for next year's consuming season

By George N. Moore

THE refiner in 1923 did more business and made less money, if he made any at all, than in any year in his history.

With an increase in the consumption of gasoline of more than 26 per cent; of lubricating oil of 15 per cent, of kerosene of 1 per cent, and of refined fuel oil and gas oil of 11 per cent over the first ten months of last year, most of the refiners who buy crude oil in the open market have found themselves scraping the bottom of their cash registers and carrying heavy obligations with their bankers.

Over Production Not All

Fundamentally, of course, there was too much crude, but that is not the whole story.

For a surplus of crude need not always mean, and in fact in many instances has not meant, too much gasoline.

There is too much wheat in the world, but the millers have not attempted to grind all the wheat they could lay their hands on and overload the market with flour. The price of flour has been determined by the price of wheat.

In the case of crude oil and gasoline, however, the overproduction of gasoline has had a profound effect upon the price which has been paid for the raw material. When the stocks of gasoline became burdensome, there was a great hue and cry that the price of crude oil was too high to permit the refiner to live. Whether one regarded the price of crude oil as too high or too low at that particular time, one must admit that the refiner has a greater obligation to the producer than merely to overmanufacture gasoline and then to turn and ask the producer to absorb the losses entailed by the refiner through an unjustifiable accumulation of stocks.

It is now more clearly apparent than ever before that the preservation of a fair equilibrium between the supply and demand for gasoline and for other petroleum products is equally essential to the welfare of the producer, the refiner, and the public.

In making this statement, I, as a refiner, am not taking upon the shoulders of the refining industry the entire, not even the major responsibility of the difficult year now drawing to a close, but I am fair-minded enough to admit that the gasoline situation through which we have been passing could quite easily have been created, even had the overproduction of crude oil been far less pronounced than it was.

Stocks of gasoline held by refiners at the close of October constitute more than a sufficient reserve for next year's consuming season, George N. Moore told members attending the Fourth Annual Meeting of the American Petroleum Institute held in St. Louis on December 11-13.

Problems that will have to be met by the trade in 1924 are reviewed in the accompanying speech of Mr. Moore.—The Editor

In fact, at the end of May, 1923, we had excessive stocks of gasoline, although up to that time the crude oil supply had not become really burdensome. It seems quite apparent now that nothing but a positive and, of course, unexpected shortage of crude, or a drastic restriction of runs by refiners could have prevented a precipitate decline in prices to a level below the cost of production,

It is much easier now than it was during those stirring events to trace out their major causes. Not only are the statistics fully available now, as they were not then, but it is also easier to gauge accurately the human and business factors in the situation.

Markets Human Institutions

Perhaps a market always should be the result of a study of statistical abstractions. Then all one would need, to be a successful refiner, would be an adding machine and a teakettle. The fact is, however, that markets are human institutions, and unless the conditions of supply and demand create an overwhelming tendency, markets for comparatively short periods at least, are governed more by competitive conflicts based upon the immediate and selfish interests of the moment, than by long-range considerations or by rules of thumb.

Therefore, in making a review of the causes of the refiner's troubles of the past year, perhaps the most outstanding phase of the competitive struggle east of the Rocky Mountains has been the change in the method of purchasing crude oil in the Mid-Continent field, inaugurated by the major purchasing companies in the late fall of 1922.

Before that time, in general, in the Mid-Continent field, a barrel of oil had been a barrel of oil to the larger purchasing companies; that is to say the quality of the oil for gasoline-making purposes, roughly indicated by its gravity, was not recognized by proportionate graduations of price made by the larger companies. Such companies depended upon the general average of the crude purchased by them to justify the payment of uniform prices for various crudes which in actual refining experience had varying values.

Paying Premiums

On the other hand, the smaller and so-called independent refiners, constituting as a whole a great army of competition and purchasing, in the aggregate, hundreds of thousands of barrels, but individually comparatively small amounts of crude oil, paid for their crude, roughly, in accordance with its quality, and by paying premiums over posted price obtained the lion's share of the lighter and more desirable crudes.

The continuance of the policy of the larger companies of paying uniform prices for the varying kinds of crude was contingent upon their ability to obtain sufficient crude. For years speculation had been common as to when a change in the method of purchasing would occur. It was generally anticipated that the change, if any, would come at a time when there was a severe competitive contest for the light crudes.

There was such a struggle for crude oil in November and December, 1922. It was known that the light oil production of Mexico was falling off. It was true, however, that the increased production of California was a menace, but its future effect was not fully appreciated at the time. Refiners' minds throughout the country were directed principally toward the acquisition of sufficient crude to meet an unprecedented, but not accurately gauged demand for gasoline. The consequence was that there was a scramble for crude oil be-

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How large is the float?

Its diameter is one foot less than the tank diameter.

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Either riveted or welded; preferably the latter.

Does the float have a rim?

Yes. It is 17 inches high.

Is the float reinforced?

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How close does the seal approach the tank shell?

It bears directly against the shell.

Is there no evaporation space whatever?

There is a maximum open space in a 55,000 barrel tank of only 15 square feet.

Would not this cause some evaporation?

Practically none. The open space in a 55 with ordinary roof is more than 10,000 square feet.

Yes, but if the ordinary roof is gas-tight would not that prevent evaporation?

No. Air is sucked in and expelled by breathing and filling and the expelled air takes much valuable gasoline vapor with it.

How much?

This question is too broad to be answered here, but, for example, a 55 handling 10,000 barrels of crude a day will waste $10,000 worth of gasoline in a year.

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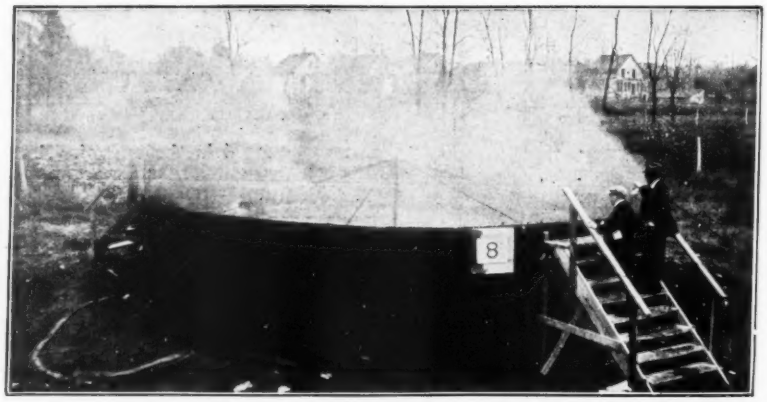

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These tests were *real* tests. They were not made on a model, but on a tank *30 feet* in diameter. They were not performed on a tank of crude but on a tank containing gasoline. The tests were witnessed by many prominent oil company officials, engineers and insurance men.

The official report on the tests prepared by an impartial firm of engineers, The Pittsburgh Testing Laboratories, brings out some astounding facts. For instance:

> "A soldering torch was used with a yellow flame about 15 inches long. This flame was played against the inside of the shell of the tank, just at the top of the shoe. This operation was carried out until about a third of the circumference had been covered.
> Result: No fire."

And again:

> "A gasoline soaked piece of waste was ignited and thrust into one of the vents. There was an ignition of the vapor similar to that occuring when the torch was held at the mouth of the vent but of considerably less intensity. Vapor continued to come from one of the vents and to burn for about ten seconds. Then there was a slight pop and all flame was out.
> Result: No continuous fire."

You will want to read the complete report, which contains pictures of the tests, tells how the tests were performed and gives a description of the major parts of the roof. The adjoining coupon will bring it to you.

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tween hundreds of purchasers. Every barrel of Mid-Continent crude oil produced in November and December, 1922, was rapidly absorbed by refiners. No Mid-Continent oil went into pipe line or tank farm storage. In fact there were small drafts on crude stocks. It is quite reasonable to suppose that under these conditions some of the major purchasing companies, with large present and future obligations to furnish crude oil, drew quite heavily on their storage during this period. Obviously other companies, not having similar obligations, did put oil in storage despite the drafts on stocks as a whole.

It was at this time that the major purchasing companies changed their previous method of buying oil, abandoning their flat prices for all grades, and commenced to purchase oil on the basis of gravity. The psychological effect of this change and the resulting bullish feeling which swept over the entire Mid-Continent field can hardly be over estimated in relation to its direct effect on the subsequent movements of crude oil prices upward and downward and upon the gasoline situation.

Change Brings Reaction

This is a human world, and the change in the method of purchasing produced a natural reaction in the minds of independent refiners who struggled all the harder to hold their crude and to get more. The consequence was that the change added little, if any, to the amount actually purchased by the larger companies.

If this condition continued, it was apparent that a general rise in the price of crude oil, caused by keen competition, was inevitable. In an ideal world, where commercial rivalries are worked out on purely theoretical and altruistic principles, it is possible that at this time there would have been enough give and take in such a situation to permit everybody to have just enough and no more, but in a purely practical world, governed by competitive struggles, no such result could be obtained. In retrospect, it is quite apparent that if either those purchasing companies which drew on storage had permitted the situation to ride along, or if the independent refiners had reduced their purchases to a point which would have permitted the larger purchasing companies to acquire additional quantities of oil, the subsequent advances in price which have been severely criticised would not have occurred. My own view of the matter is (and I may say this without the slightest criticism) that if the larger buyers of crude oil had been content to bide their time for a comparatively short period the independent refiners themselves soon would have recognized clearly that their purchases of crude oil were disproportionate to their actual refining needs. Candor compels me to say, however, that this is much clearer now than it was then.

January opened, therefore, with a more or less active battle between competitors varying in size from a refinery using a few hundred barrels a day to purchasing companies requiring more than one hundred thousand. This battle was a most vigorous one, notwithstanding the fact that on January 1, 1923, the refiners of the United States had in refinery storage more than 21,000,000 barrels of gasoline, the largest amount of gasoline ever held in refinery storage in our history with the single exception of stocks on the last day of May, 1922, which were about 200,000 barrels higher than the figure named. Thus the refiners of the country were entering the period of low demand with stocks of gasoline at a point which was higher than they should have been at the beginning of the consuming season of 1923.

It is, of course, true that due to the seasonal demand for gasoline it is necessary to draw on refinery storage to carry the peak load of demand during the summer months, but it is open to serious question, whether the refiners are not more apprehensive about meeting the peak demand than the facts of the past few years would seem to require.

In 1920, the total draft on refinery gasoline stocks during the season of heaviest consumption was 8,460,887 barrels; in 1921, 8,195,860 barrels; and in 1922, 4,814,690 barrels, or an average draft on stocks during these three years of 7,157,146 barrels. Therefore, it would seem to be clearly indicated by experience that so far as the actual necessities of the situation are concerned the refining industry would have been in a healthy condition, and would have been fully prepared to meet the demands of the public, if the stocks of gasoline on hand January 1, 1923, should have been cut squarely in two.

The refinery gasoline stocks which were actually on hand, viz., more than 21,000,000 barrels, represented the refining of approximately 58,000,000 barrels of crude oil, and yet there was a struggle for crude. Bullishness was in the air, and in January, 1923, the refiners of the United States actually produced more gasoline than they had ever produced before in a single month. February, which is usually the month of lowest demand, surpassed in daily average production of gasoline the figures of January, and in March and April even these record-breaking figures were exceeded.

Optimism

Dramatists in writing tragedies usually have not only a major tragedy, but two or three minor ones in the course of the play. The spirit of optimism not only spread through the refining and producing industry, but through the jobbing industry as well, aided and abetted by probably the best winter weather conditions for motor travel during January and February that have ever been experienced. The movements from refineries, therefore, was unprecedented for this period of the year. In the United States as a whole, in January and February, the movements from refineries were more than 50 per cent in excess of what they had been in the corresponding period of the previous year. When a period of rising prices occurs in the winter months, such movements from refineries may be stimulated by the desire of jobbers and retailers to fill their storage against the spring demand by purchasing immediately quantities in excess of their actual requirements, which purchases, nevertheless, tend to exaggerate the estimate of consumption. This was true last winter. Let us hope it does not deceive us again this winter. In the Mid-Continent field, the situation was even more intense. The Kansas-Oklahoma refiners in January moved from their refineries more than 100 per cent, and in February more than 68 per cent in excess of the movements for the same months in the previous year. It was during this period of intense misguided competition that Mid-Continent crude oil advanced 60 cents a barrel on advance, which I believe ought never to have been made, had there been, on the part of all interests involved, a clear appraisal of the conditions of supply and demand, a mistake, and I say this without any criticism, because I think there was a good deal of mutuality on the part of all competitors in the failure to gauge the market conditions, a mistake which was one of the greatest in the history of the industry. I do think, however, that I can say without any spirit of unfriendliness that the larger the resources and the obligations of the crude oil purchasers the greater should be their responsibility to the public and to the oil industry as a whole to gauge correctly what the actual statistical situation is. It took only two months to demonstrate that this advance was not essential, for in April, 1923, crude again commenced to decline.

On Top of the Hill

The whole industry east of the Rocky Mountains was on the top of the hill, and the only question was whether it would slide down the hill or tumble down. Refiners in Kansas and Oklahoma, for example, at the end of February, 1923, had more gasoline in relation to their demand than ever before in their history, and conditions grew steadily worse throughout the spring.

It would probably be a waste of time for me to enter into a discussion before this meeting as to whether the industry went down the hill just as fast as it ought to have gone, or whether the rout which occurred could have been made a more orderly retreat. The result was inevitable, and the only question for debate was the time and manner of it. Under such circumstances competition was sure to reduce prices to a level which, but for competition, would be entirely without warrant, if due consideration were given to refiners' and producers' costs. Gasoline and crude oil both went below and are still below their fair cost of production.

In the foregoing summary of the situation, I have perhaps not given the emphasis to conditions in California that some would think essential, nor to the increase in refinery efficiency, nor to the lighter character of the crude oil which were refined. These all contributed in a more or less important way to a confused situation, but when one faces the fact that the demand for gasoline in the country as a whole has been more than 25 per cent greater than last year he can see that despite all of these elements referred to the year might have been a prosperous instead of an unprosperous one. During the 10 months ended October 31, 1923, Texas, Louisiana and Arkansas refiners increased their sales more than 26 per cent; Colorado and Wyoming refiners more than 21 per cent, and Oklahoma and Kansas refiners more than 20 per cent over the previous year. This regardless of the fact that for the same period California refiners increased their output more than 88 per cent.

However, there is one phase of the marketing of gasoline from refiners which was and probably will continue

Industry Overlooking $1,000,000,000 Market

Failure to take advantage of opportunities and lack of foresight cause of market slump

By Henry L. Doherty

LAST summer I made the statement at a meeting of the board of directors of the American Petroleum Institute that it should be possible for us to market all the oil we are now producing and still increase our revenues $1,000,000,000 a year in excess of what they are now. I have seen no reason to change my mind.

If we can increase our revenues by $1,000,000,000 a year, surely we can afford to devote time and serious thought to the subject and spend some money on a sales campaign. As business men it is up to us to sell our product wherever it has the greatest value to the user. This is not simply good business but it is in accord with the laws of economics and the laws of true conservation.

If there is any other important industry in the country that gives less thought or spends less money collectively for the good of the business and the development of that business, I don't know what it is.

"Wrong" Not the Word

When the retail customer can occasionally buy gasoline in some parts of the country at less per pound than he would pay for anthracite coal and can often buy kerosene at less per pound than he would pay for anthracite coal, it requires no great intellect to know that there is something wrong about the business. In fact it is so wrong that the word "wrong" does not express the situation and we have to use the nasty word "rotten".

"There is something wrong with any business or branch of any business that does not require salesmanship."

I wrote that statement many years before I went into the oil business. I have never doubted it then or since. Every branch of every business ought to be conducted at a profit. Price structures and price levels should be such as to make every branch of our business desirable and worth stimulating. If there is anything we have for sale that we do not care to devote salesmanship to then there is something basically wrong with our methods. Things which do not require salesmanship are generally sold too cheap.

Pointing out the possibilities of initiative creating additional large markets, Mr. Doherty in his talk before the American Petroleum Institute said that what the industry needed was less wind and more work, less talk and more thought, less bellyaching and more brain effort, less bile and more guts.—The Editor.

Too Much Talk

The oil man has talked oil famine for so long and has governed himself accordingly and the history up to date is that he has fooled himself and nobody else, and his continual expectation of a famine has cost the oil industry billions of dollars. I have talked about an oil famine and have believed it, but I am going to quit talking about it and I am going to urge everybody else to quit talking about it for if the continual talk about an oil famine has the effect of causing the oil business to disregard the rules of self-preservation, then it is time to let somebody else do the worrying about the shortage.

It is our duty to prevent the devastation of the oil resources of this country to the best of our ability and when we have done this, then it is up to us to sell whatever oil must come on the market, be that amount much or little, to the customer who can pay the best price.

If oil for railroad use is worth half again as much as for use in the stationary power plant then it is up to us to sell all the oil we can for railroad use.

If such oil is worth still more for ship propulsion than for railroad use, then we should endeavor to sell all the oil we can for ship propulsion.

If it is worth still more for household heating than for ship propulsion, then we should endeavor to sell as much as we can for house-heating purposes.

There is no group of men I have ever worked with that I like better than the oil men. On the other hand there is no group of men I have ever worked with that get on my nerves at times worse than these same oil men.

No Foresight

I have no patience with any industry that is willing to lay down and let the steam roller go over them, nor have I any patience with an industry which devotes all of its time to blaming some one else in the industry for their troubles instead of courageously meeting those troubles. The oil industry is like the man with a leaky roof. When the weather is fair the industry has not the foresight and enterprise to fix the leak and when the weather is bad it can't fix the leak.

This idea that all the troubles of the producer are blamable on the refiner and all the troubles of the refiner are blamable on the producer or the jobber or somebody else is 90 per cent bunkum. If we could correct all of these troubles to everybody's liking we still would not in times of trouble be able to notice any improvement for the difference would be so small.

I want to see an industry in which every branch of it is prosperous and happy. There is no need for one branch of the business to take away any of the legitimate profits of any other branch of the business. We are

(Continued on page 22)

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to be of major importance, viz. the agreements known in the trade as marginal contracts. The cofusion in the public mind and in the industry arising from these contracts during the past year constitutes sufficient ground for an explanation of their character and a querry as to their being economically defensible.

It is well known in the oil industry but not so well known to the public that the bulk of the gasoline produced by refiners in the Mid-Continent field is not sold by the refiners directly to the public, but it is sold to jobbers and distributors who buy in tank car lots and resell to garages and to the public.

There are two methods of doing business with these jobbers or distributors: One, the current sale of gasoline f. o. b. the refinery in tank car quantities at the prevailing market at the refinery; the other the sale under marginal contracts between the refiner and the jobber. The substance of these contracts is that the refiner guarantees to furnish the distributor with certain specified quantities of gasoline, customarily over a period of months at a fixed margin of price below the prevailing tank wagon market. This margin varies to some extent, but in reality it is an effective guarantee of a profit to the jobber regardless of the tank wagon market, provided the jobber does a sufficient volumn of business to pay his ordinary overhead.

Under these two methods of doing business, a refiner may realize a netback at the refinery on his marginal contract, either considerably above or below the current f. o. b. tank car price. This year when a surplus of gasoline accumulated in the Mid-Continent field, the price f. o. b. refinery, fell far below the cost of production, and placed the refiner's customers having marginal contracts in an almost intolerable position. I doubt whether this is the time and place for the expression of opinions as to the economic defects and defensibility of marginal contracts. It does not seem improper, however, to suggest that all of the questions surrounding the marginal contract system ought to be investigated carefully, for the purpose of ascertaining whether contracts of this nature are really beneficial to the industry and to the public.

The foregoing statements which I have made, when read by members of the general public and even by members of the oil industry, may lead to the impression that enormous quantities of gasoline were accumulated during the year, and that the markets of the country were slow to respond to the situation. As a matter of fact, quite the reverse has proved to be true. I doubt whether the total excess of gasoline above what might be called normal stocks, in the hands of Mid-Continent refiners have at any time this year, exceeded three or four million barrels. When one takes into consideration that this quantity did not exceed 2 per cent of the total gasoline requirements for the year 1922, he obtains a fair index of the competitive nature of the oil business. It is one of the anomalies of

(Continued on page 13)

Viscosities of Fuel Oil From Panuco Crude

Heat cracking converts high viscosity asphaltic crude to low viscosity fuel oil

*By R. V. Brownlee and Wm. H. Coburn**

SOME three and a half years ago, our laboratory undertook to solve the problem of devising a method for producing fuel oil from Panuco crude.

The prevalent suggestion at that time by refiners was to top the small amount of naphtha in the crude and run to coke enough of the crude to produce sufficient gas oil to blend with topped crude so as to furnish a fuel oil of a viscosity and pour test satisfactory for general use as a heavy fuel. This necessitated an expensive plant with high overhead and upkeep and operating expense.

At that time the Bunker "C" specification for heavy fuel had not been published and the 14-16 gravity Mexican fuel from light Mexican crude was the generally accepted standard for heavy fuel.

Our problem then was to devise, if possible, a method for making a fuel oil having the required characteristics of 14-16 gravity fuel, differing only as to gravity. It seemed probable, in spite of various statements to the contrary, that the viscosity of the heavy asphaltic crude could be broken down by heating and if this could be accomplished without, at the same time, causing a separation of coke, it seemed likely this might be accomplished without anywhere near the expense of the usual method proposed.

A few experiments were carried out, using one to three litres of Panuco crude oil and then an equipment was made to treat 10 litres at once. At first, attempts were made to heat the crude in a small still with a reflux condenser so regulated as to allow only gasoline and naphtha to distill off. This was tried both at atmospheric pressure and at higher pressures, but was found to be unsatisfactory in that, while the viscosity was in some cases materially lowered, the temperature was not sufficiently high under atmospheric pressure to sufficiently crack the heavy oil and higher pressures involved too many difficulties and high expense. Accordingly, a distillation was started in a still charged with 10 litres of Panuco crude and gas heat applied so as to distill off the lighter fractions in the usual manner and under atmospheric pressure. From time to time, the gas was turned off and after practical cooling, a measured sample was taken from the still. Heat was again applied until another fraction of distillation was taken from the still and after allowing still to cool again somewhat, another measured sample was drawn off. This operation was repeated until 60 per cent of distillate had been taken from the still.

Table I indicates the temperature in the oil during the distillation, the percentages of distillates at each stop in the operation, the percentage of naphtha up to 440 degrees Fahrenheit on basis of crude, gravity of the naphtha, percentage of heavier distillate, gravity of same, viscosity of each sample drawn from still and the viscosity of each sample drawn from still after the proportionate amount of gas oil has been added thereto. The above viscosities are plotted against the percentage of distillate off as shown in Figure A.

The exact form of these curves will vary somewhat with the method of operation, size of stills, etc., but the general characteristics apparently hold. Similar operations with stills in which several hundred barrels were treated, indicated that the lower viscosities of the mixture of residue and distillate occur at only slightly higher percentages than here represented.

Table II shows some of the properties of this fuel oil while Figure B shows graphically the temperature-viscosity curves of a number of laboratory samples of fuel oil as compared with a regular 16 gravity fuel.

It will be noted that we covered a rather wide range with the laboratory samples in order to learn the possibilities. A still four by 12 feet equipped with an inner stirring device was next installed and the results of a number of runs are shown in Table III and Figure "C".

Temperature viscosity curves for not only the fuel oil made during these special runs but also for comparison tests on two samples of heavy oil from light Mexican crude are shown. It will be noted by comparison of these curves that the fuel oils are analogous with respect to temperature-viscosity relationships. Refer to Figure C.

As is generally known, the viscosity of an oil having high asphalt content, increases quite noticeably upon standing and it was feared that this tendency might be more marked than usual but at the time, we were convinced that no danger existed on this account.

Commercial scale operation of the

*Paper presented before the Petroleum Division of the American Chemical Society.

TABLE I

DISTILLATION OF PANUCO CRUDE OIL

10 Litres Used—Gravity 12.4

Temp. in Oil	Percentage off	Percent-Naphtha on 440 F.	Gravity Baume of Naphtha	Percentage of Gas Oil	Gravity Baume of Gas Oil	—Viscosities 210 F.— Saybolt Universal Residue	Residue and Gas Oil	Flash Cleveland Open Cup
Panuco Crude	....	....	....	....	....	....	535	135° F.
560° F.	5.1	4.98	53°	0.02	....	1080		
636	10.1	8.12	41	1.57	34.0	1885	1862	
696	16.6	8.51	40	7.67	31.0	2865	1053	
718	21.6	9.41	52	11.67	28.0	2100	653	
720	26.6	10.68	51.2	15.21	27.0	2275	480	
702	32.35	11.88	51.5	19.61	27.5	3505	512	
710	37.83	13.01	51.5	23.81	29.0	....	540	
710	42.41	14.21	52.0	27.11	33.0	....	830	
710	51.01	21.29	54.6	28.61	36.5	....	3750	
724	55.31	22.63	52.2	31.41	33.0	....	4740	
Gravity average sample.....			51.4		31.5			
Distillation loss 1.27%.								

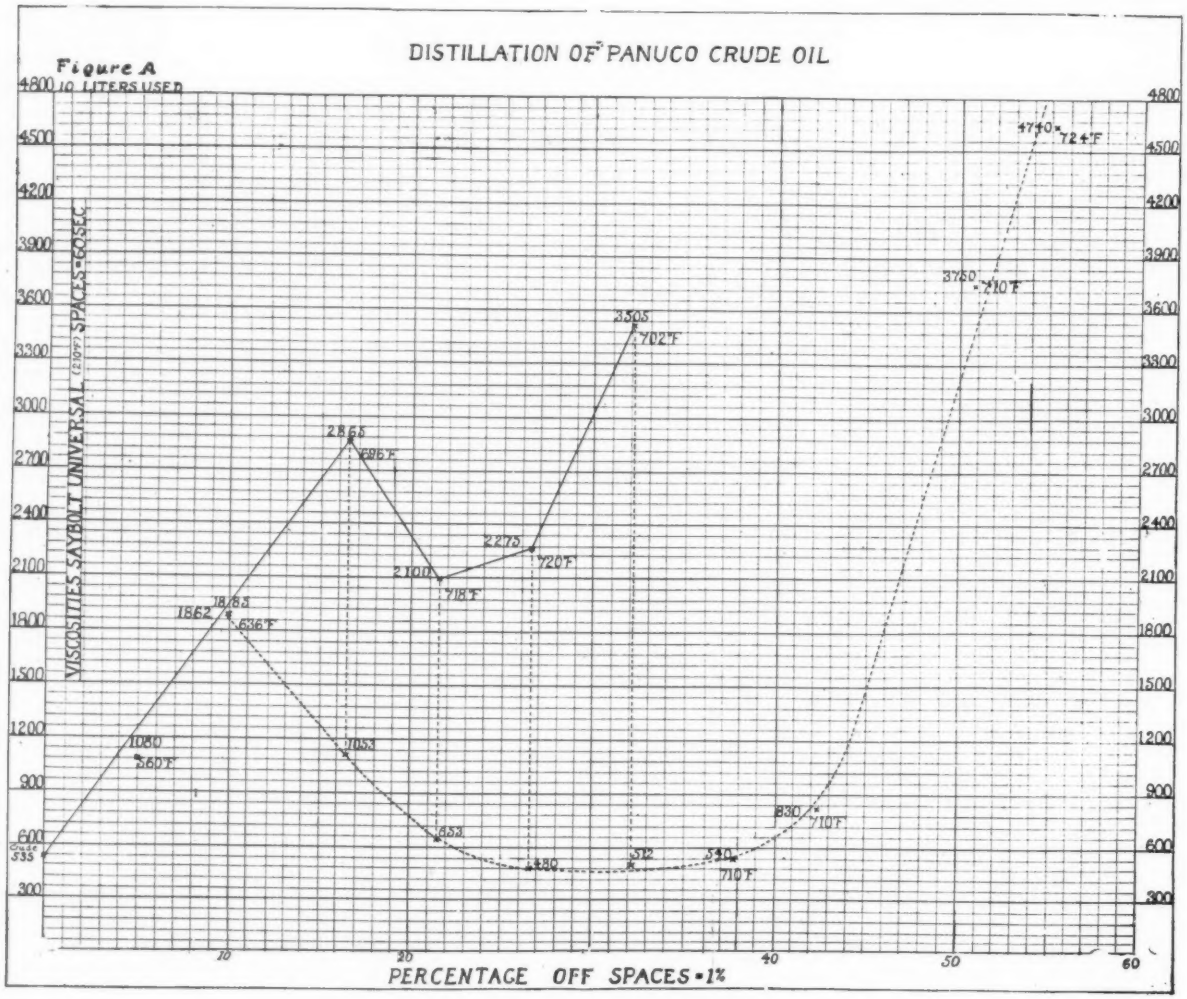
TABLE II

VISCOSITIES ON FUEL OIL MADE FROM PANUCO CRUDE

Temperature of	Viscosities—Saybolt Universal Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4	Sample No. 5
80	....	1646	....	5728	37152
100	3323	897	7772	2792	8254
120	....	....	3360	1319	4172
130	1351	....	1445	....	....
140	....	....	1121	683	1884
150	808	....	666	....	....
160	....	291	531	418	1129
180	....	199	335	280	569
200	....	159	200	185	339
210	....	....	....	154	247
212	180	137	124	152	238
	Residue Gr. 11.0	Residue No. 1 + Gas Oil 11.1	Residue Gr. 11.2	SS Aquitania (July, 1920) Gr. 16.1	Residue + Gas Oil Gr. 10.6
Naphtha	15.7%		4.5%	Light Mexican	
Gas Oil	4.9%		0.0		

Casper, Wyo.—The recent deal between Producers and Refiners Corporation and the Prairie Oil and Gas Company is believed here to indicate that the company's refining and natural gasoline properties in the Rocky Mountain area will be materially increased and present holdings increased and expanded.

Mexico City, Mex., Dec. 10.—Contrary to reports, Royal Dutch-Shell interests through its subsidiary, Mexican Eagle, will continue operations in Mexico, according to Sir Henri Deterding, managing director.



process modified to use existing equipment with minimum charge was begun before the so-called semi-commercial experiments were completed. This commercial operation was entirely successful with the exception that repairs upon still bottoms were very heavy. It is believed that a still of the general design of the one used in semi-commercial operation will largely obviate this difficulty. By constantly stirring the oil, tendency to coke is obviated. A pipe still could be used for most of the distillation thus increasing the thruput.

Plans were drawn for a 10,000 barrel refinery to be erected in England and to be equipped with stills of this new type but the sudden slump in fuel oil prices caused abandonment of the plans.

Several cargoes of this fuel oil were shipped abroad late in 1920 and early 1921, with no complaint excepting in the case of one cargo. When this was being unloaded, it was found that the pumps would not handle some of the oil and upon investigation, there was said to have been found a thick liverlike residue on the bottoms of some of the compartments that had to be shoveled out of the ship. At the time, we expected to get samples of this residue

TABLE III

VISCOSITY ON FUEL OILS MADE FROM PANUCO CRUDE

Gravity of Panuco Crude Oil Used—12.4

Viscosities—Saybolt Furol. Temperature of	Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4 Run No. 3	Sample No. 5 Run No. 3	Sample No. 6 Run No. 7
80	1358	1080	1858	938	1190	1391
100	590	504	858	361	543	514
120	248	213	355	150	231	219
122	215	206	321	141	196	178
140	125	107	157	81	98	125
160	73	73	97	51	61	66
180	46	47	54	31	41	41
200	26	31	34	21	25	27
210	24	28	28	18	22	22
	Gr. 15.4 Light Mexican	Gr. 16.2 Light Mexican	Gr. 11.5	Gr. 12.7 March 24, 1921	Gr. 12.7	Gr. 12.4

TABLE IV

Temperature	Sample No. 1—Run No. 3 Made March 23, 1921 Heated nine hours, refluxed at 720° F. 37.6% off —Viscosities Furol— March 24, 1921	August 15, 1921	May 11, 1923	Sample No. 2—Run No. 7. Made April 22, 1921 Heated four hours without reflux at 720° F. 36% ff. Viscosity Furol @ 122° F. = 161 —Viscosities Furol— Aug. 17, 1921	May 14, 1923
80	938	1190		1391	
100	361	543		514	
120	160	231		219	
122	141	196	860	178	465
140	81	98	350	125	233
160	51	61	162	66	119
180	31	41	83	41	61
200	21	25	42	27	37
210	18	22	37	22	32

but same were never received and our conjecture was that probably the cold ocean water had chilled the oil and it had not been sufficiently heated by the steam coils before reaching port. We have since investigated this however, and now conclude that doubtless there were leaks in the steam coil or possibly between the plates of the ship as we have found that the presence of water, whether fresh or salt, greatly accelerates the setting or coagulation of the fuel oil. See Table IX.

A number of elements apparently affect this setting; for example, agitation, oxidation, moisture, time and temperature.

We happen to have in our laboratory a number of samples of fuel oil prepared over two years ago and hence, when we decided to publish this information some three or four months ago, we had this on hand. Naturally, a number of ideas occurred to us that caused us to regret that several different experiments had not been started a couple of years previously so that the results could now be tabulated. This suggested the idea of raising the temperature of the fuel being treated so as to accelerate the action and thus eliminate waiting several months for something to happen.

Table IV shows the viscosities of two samples of fuel oil made early in 1921. First at the time of production in August of 1921 and in May of the present year. Samples have stood upon the laboratory shelves during this period. Average temperature doubtless would be 75 to 80 degrees Fahrenheit.

We have in the laboratory, several gallons of crude from the same car as used over two years ago and viscosities Furol of this were determined and were as shown in Table V.

This crude was treated as previously described, being heated to 720 degrees Fahrenheit, taking off 36 per cent, then redistilling the distillate to strip off the naphtha and mixing back the gas oil and pitch. This particular sample upon distillation showed as follows:

TABLE VI

Naphtha, 2.6 per cent
Gas oil, 33.6 per cent
Pitch, 61.4 per cent
Loss, 2.4 per cent.

This gave a fuel oil having a viscosity of 160 degrees Furol at 122 degrees Fahrenheit.

Upon standing in laboratory for five days at an average temperature of about 80 degrees Fahrenheit, the viscosity of this fuel oil had increased from 160 to 184 Furol at 122 degrees Fahrenheit, and after 14 days to 190 and upon being heated successively to the temperatures shown below and viscosity then determined at 122 degrees Fahrenheit, shown in Table VIII.

At the same time a sample was placed in an ice box and after remaining there for 17 days, still had a viscosity of 184.

After 15 days at laboratory temperature, the viscosity of this sample had increased to 186 and after 28 days at room temperature had increased in viscosity to 205 Furol at 122 degrees Fahrenheit.

A fresh sample of the same oil was held in oven at 180 degrees Fahrenheit and viscosities Furol were determined. The results are shown in the following table:

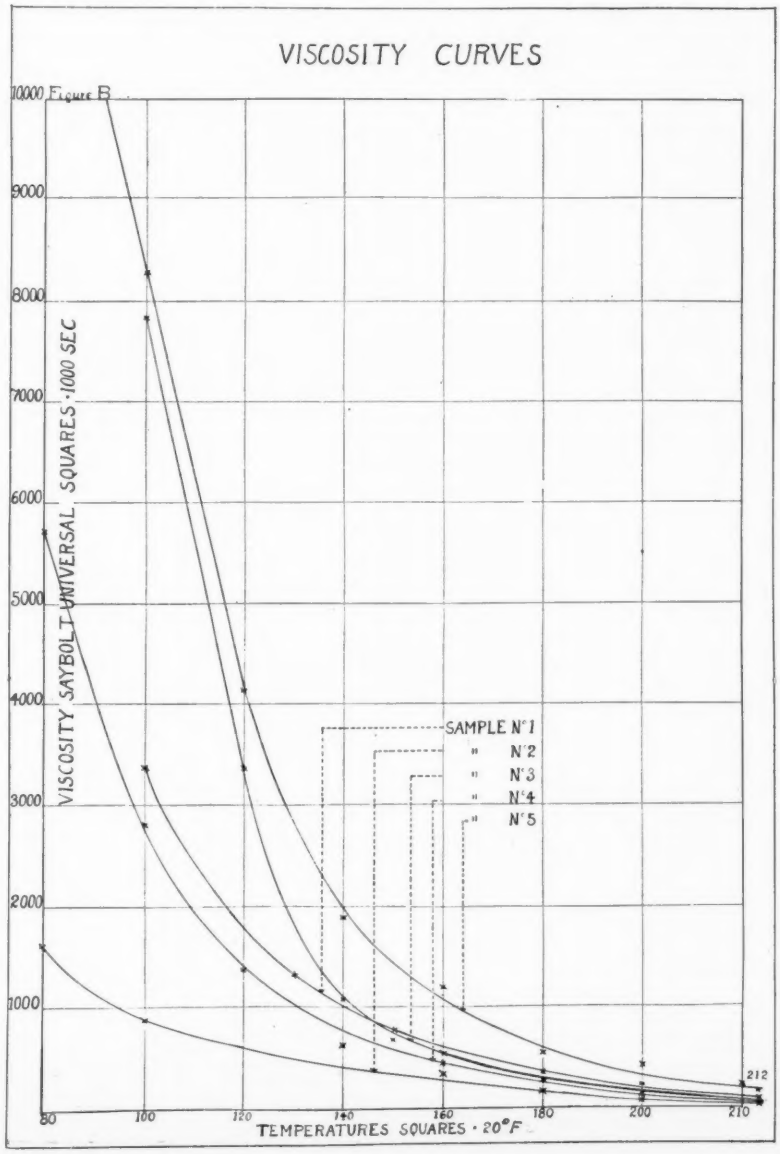
Two fresh samples of this same oil were placed in flasks connected to reflux condensers heated to 180 degrees Fahrenheit.

The foregoing results indicate that agitation and oxidation evidently play an important part in the above changes in viscosities of this heavy asphaltic fuel oil. (See Figure D, illustrating tables IV, IX, and X.)

In order to determine whether or not it was possible to restore fuel oil to lower viscosity after it had apparently set upon standing, the sample from tests shown in Table VII above was taken and after viscosities from 122 degrees up to 210 degrees Fahrenheit had been determined, the sample was again cooled at 122 degrees Fahrenheit when it showed a viscosity of 642 Furol. This sample was heated to 300 degrees Fahrenheit for one-half hour and upon cooling to 122 degrees Fahrenheit the viscosity was 361. Heating was repeated for another half hour when the viscosity Furol at 122 degrees Fahrenheit was 292.

Test upon this sample showed that relatively slight heating would cause a reversion to lower viscosity oil. We endeavored to check this result, however, and while, during the first half hour, the viscosity dropped, the heating was repeated four more times and the viscosity constantly rose instead of dropping as was expected.

Even a temperature of 400 degrees Fahrenheit failed to give consistent results and we are finally led to the conclusion that a temperature approxi-



mately equivalent to temperatures originally used to break down the viscosity are required to get uniform results.

For comparison, some fuel oil made from heavy Argentine crude from the Commodora Rividavia field was heated at 180 degrees and viscosities taken at 122 degrees Fahrenheit Furol. This fuel had a viscosity of 245 Furol at 122 degrees Fahrenheit when first made up and after standing in the laboratory for 16 days, showed 420 Furol at 122 degrees Fahrenheit.

It will be noted that fuel oil from Argentine heavy crude does not as rapidly increase in viscosity as does that from Panuco, although the same tendency in shown.

In general, we may conclude from the foregoing data that high viscosity asphaltic crude oil can be converted into suitably low viscosity fuel oil by partial cracking by heat without appreciable deposition of coke. If kept at low temperature the viscosity of this oil remains practically constant. The viscosity of this fuel increases rapidly at higher temperatures and is greatly accelerated by pressure of moisture and when agitated with air.

TABLE IX

Hours in oven at 180° F. Started	Viscosity at 122° F.	Viscosity @ 122° F. Furol with 0.5% water added	Viscosity @ 122° F. Furol 0.5% of 3% salt solution added
6	184	190	193
18	...	213	...
24	184	...	...
30	194	335	...
42	...	355	...
48	243	...	...
66	270	460	363
72	335	...	...
90	365	588	...
96	410	...	570
102	454	735	...
114	...	830	...
120	529	...	...
138	...	1009	...
162	637	...	...
168	771	...	...
186	825	1382	1002
234	1001	...	...
	1440	...	...

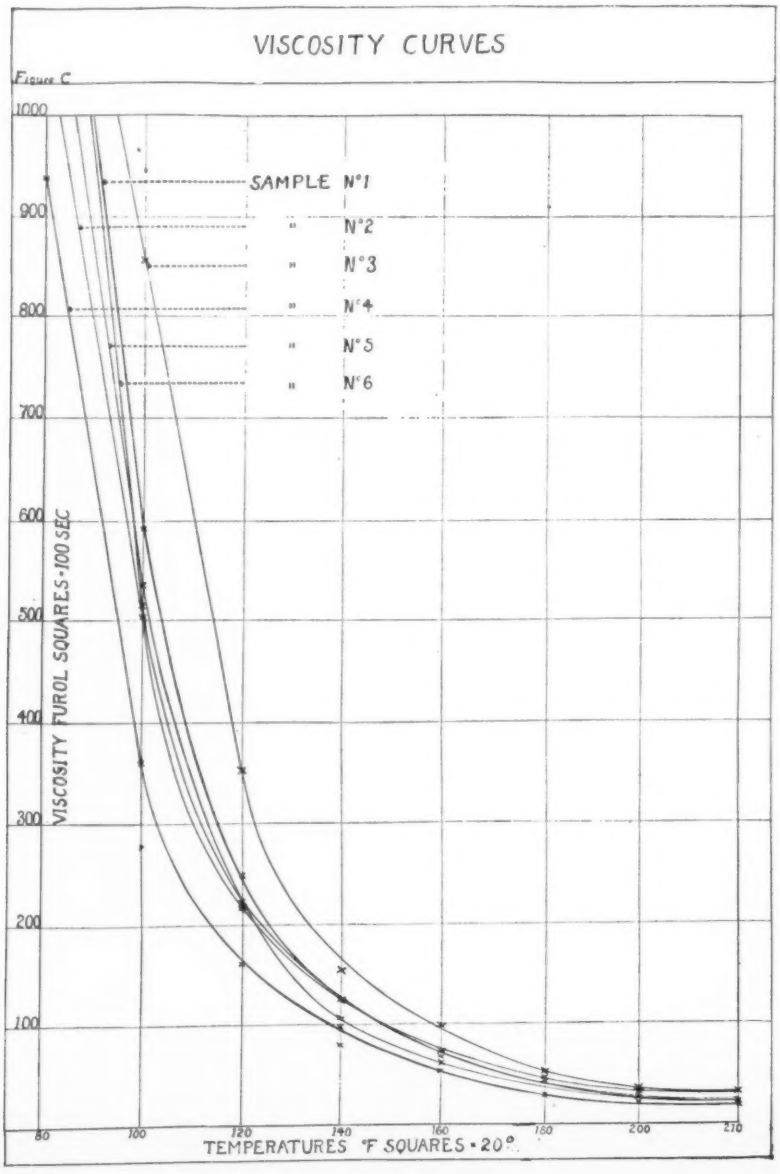


TABLE V

Temperature 100° F.	Viscosity
122	1664
140	717
160	398
180	237
200	153
210	75
	69

TABLE VII

Temperature	Viscosity (Furol)	Viscosity @ 122° F. after being successively heated to the temperature shown at left at left
122	160	160
140	96	170
160	55	188
180	36	201
200	25	217
210	23	245

TABLE VIII

Temperature	Viscosity (Furol)
122	184
140	178
160	176
180	176
200	195
210	220
230	220
250	240
270	264
290	314
300	314

TABLE X

	Sample 6 Viscosities 122° F. Air blown through oil	Sample 7 Furol @ F. Hydrogen blown through oil
When started	190	207
After 6 hours	373	...
After standing 24 hours at room temperature no blowing	401	...
12 hours	607	...
16 "	...	...
18 "	...	207
19 "	1065	...
42 "	...	217
66 "	...	237
90 "	...	257
96 "	4080	281
114 "	...	339
120 "	...	378
138 "	...	446

TABLE XI

Temperature 180° F. Hours in oven	Viscosity 122° F. Furol
...	420
6	344
24	358
30	358
48	358
96	368
102	368
126	398
174	500

Tulsa, Okla.—The Braden Refining Company, with a plant at Perry, Oklahoma, plan to reopen the plant shortly.

No Need for Additional Gasoline Stocks

(Continued from page 8)

the situation that is approximately 15,000,000 barrels of crude oil had been retained in pipe line and tank farm storage during the first six months of the year 1923, the disastrous declines in the price of gasoline probably would not have occurred, and that possibly the decline in crude would not have been so profound. Yet in view of the tremendous competition in the buying of crude oil, and in its refining, there was no power in the oil industry which could have accomplished effectively, a result which would have been defensible so far as the profits of the industry were concerned. It would seem as though this statement would clear up most of the misgivings of the public, as to whether the gasoline markets of the country are free and competitive.

I said at the outset of my remarks that it is now more clearly apparent than ever before that the preservation of a fair equilibrium between the supply and demand for gasoline and for other petroleum products is equally essential to the welfare of the producer, and the refiner and of the public. I should add that it is important to the public because competition cannot long survive the tremendous financial losses involved in such a period as we have gone through.

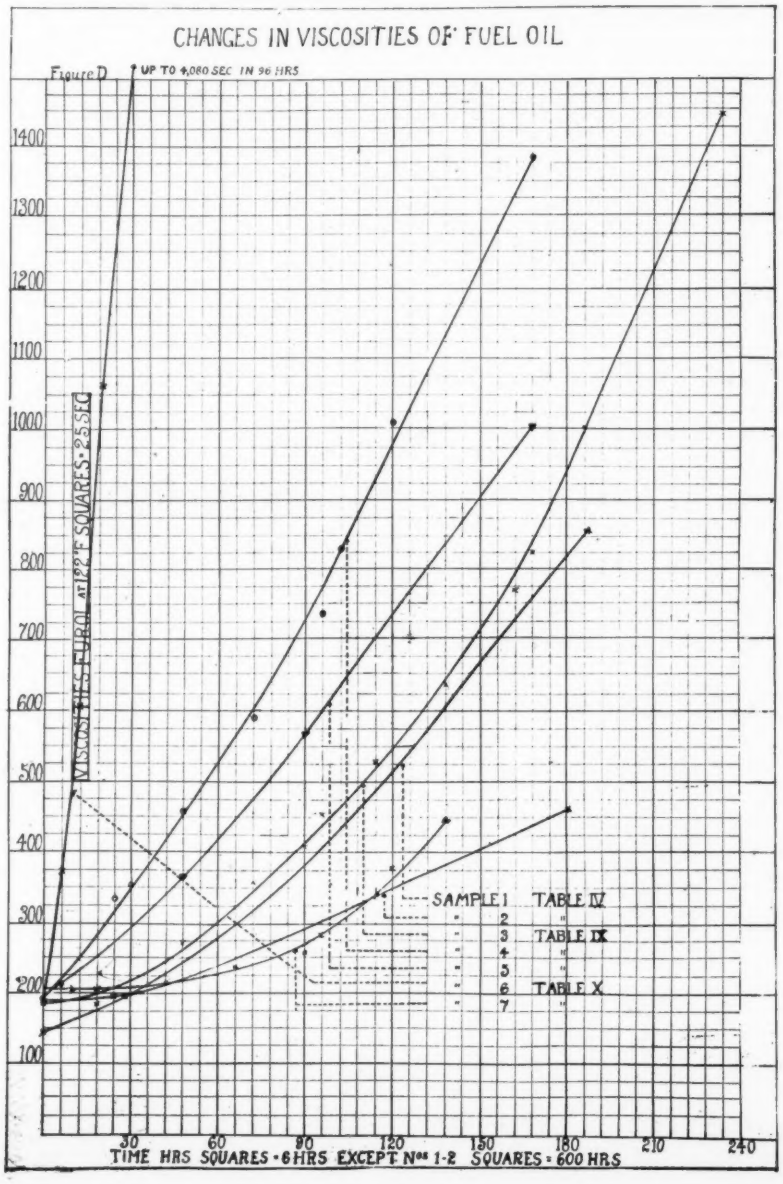
The Western Petroleum Refiners Association, of which I have the honor to be President, recently decided to collect the statistics as to runs, stocks and shipments of the various petroleum products, and we are now obtaining cooperation in the collection of weekly statistics, from refiners running in excess of 400,000 barrels a day. There is no public or competitive good to be served by having the refiners run their plants in ignorance of the essential facts of the situation, and it is my belief that all of the statistics of the petroleum situation should be brought as nearly down to date as possible; that they should be published freely for the information of the public and the industry; and that in the end, such action will result in more intelligent, and therefore stronger competition. Until this ideal can be attained in the fullest measure, it seems to me that there is a grave responsibility passed on to the larger and more powerful companies, occupying positions as market leaders, to watch their steps and to see to it that their actions in relation to the price of crude oil and the consequent stimulation of production, represent as nearly as possible, fair prices in view, not only of the necessities of particular companies, but in view of the necessities of the industry as a whole and of the consuming public.

There is necessarily price leadership in every industry—some times by the larger and some times by the small intererests. The petroleum industry is no exception. In the petroleum industry, however, some purchase crude oil from day to day on the prevailing market without contractual obligations to purchase at any future time. Other purchasers, many of them independent refiners, contract for their crude over more or less protracted periods, basing their price upon the market quotations of larger companies. During periods of transition, therefore, the independent refiner sometimes finds his market price to be one which he would not feel warranted in paying, but for his contract. His business judgment at such a time, if he were not bound by a firm contract, would influence him, either to pay a different price or to take a different quantity of crude oil.

Producers and refiners, it seems to me ought to give their most serious consideration to whether some modification of contracts over a period of months should not be made so as to leave both producers and refiners a freer hand to exercise their mature business judgment in times of crisis or abrupt changes in the market. In the long run, the freer the market, and the less it is hedged about by contractual obligations, the more responsive the market will be to trade conditions, and the more quickly will be corrected inequalities in the supply and demand.

The independent refiner and the independent producer should keep themselves in as free a condition as possible to exercise their judgment as to what the market ought to be. An untrammelled condition on the part of the independent refiner will always result in the price of crude oil being kept at the level warranted by general market conditions. On the other hand, where the independent refiner pays in a firm contract, a price higher than is warranted by the conditions of the moment, he weakens his financial ability to pay an adequate price at later periods.

So far as 1924 is concerned, I am unable to see any necessity for the addition of a single barrel of gasoline to existing refinery storage. The stocks of gasoline at the end of October were 22,544,588 barrels. This quantity constitutes more than a sufficient reserve for next year's consuming season; and it seems to me that practical business judgment on the part of refiners would indicate that no gasoline in excess of current sales ought to be manufactured. Otherwise, it seems reasonably apparent that next year we may repeat the disastrous experience of this year.



Cooling Systems and Gasoline Evaporation

Investigation made of various methods used to reduce the large annual loss

By Ludwig Schmidt

THIS concludes the article covering a series of tests made by the Bureau of Mines for the purpose of reducing to a minimum the large losses now suffered annually by the oil industry from evaporation. The first installment of the article appeared in the November issue of The Refiner and Natural Gasoline Manufacturer.—The Editor.

Test 2—Water-seal vs. Umbrella-roof

A test was made at Ponca City, Oklahoma, in June of 1922, to determine the relative evaporation loss of gasoline from a water-seal tank and an ordinary "all steel" tank with an ambrella roof.

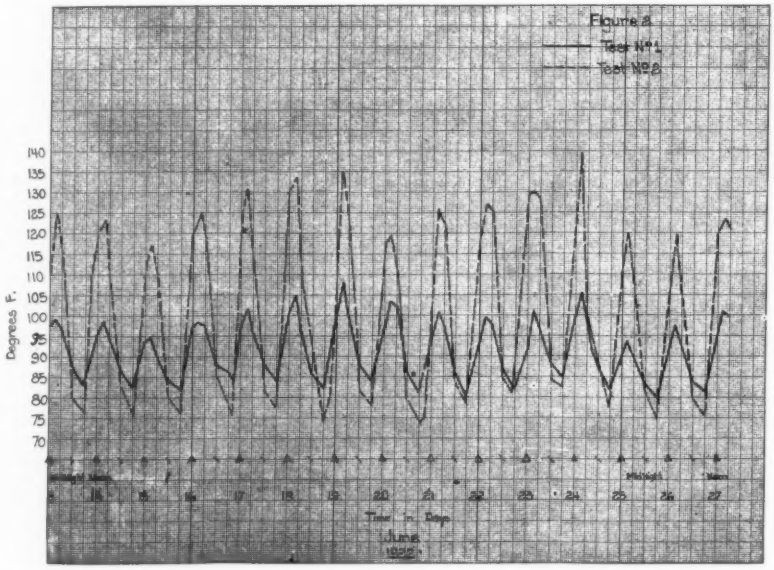
Tank No. 1 was a riveted steel tank of 560 barrels capacity. It was 20 feet in diameter and 10 feet high, had a water-seal roof equipped with water-seal thief hatch and gauge hole, and a three-inch valve for relieving pressure and vacuum.

Tank No. 2 was a riveted steel tank of 560 barrels capacity. It was 20 feet in diameter and 10 feet high and had an umbrella roof, equipped with an ordinary box swing-line hatch which also served as gauge and thief hole. The hatch cover was not tight, in fact throughout the whole test it was open about one inch due to the swing-line chain that ran between the box and cover in order to fasten outside the tank. The tank was not vapor tight. There were pin-hole leaks around the top angle and a rip in one of the seams on the roof.

Both tanks were painted white with the exception of the bottom rings, which were black. the test was divided into two periods of ten days each and the results obtained are given in the following table.

Figure 2 gives the vapor temperatures of the tanks tested from June 13 to 27 inclusive.

It will be noted that during the first ten days the water-seal tank lost 1.71 barrels and during the second 10-day period it lost only 0.18 barrels. The tanks tested had been in "run down" service at the refinery and were temporarily disconnected for the test. A valve on a run-down line had been left open unintentionally and allowed the vapors from the tank to escape through the run-down line. The open valve was discovered at the end of the first period and closed. The smaller loss during the second ten-day period showed that unless a tank is vapor tight, considerable loss will occur even when a cooling system is employed.



Results

In reviewing the results of tests 1 and 2 it will be noted that the loss on the non-cooled vapor-tight tank used in test 1 was only 1.54 per cent in 84 days as compared to a loss of 1.21 per cent in 20 days from the non-cooled, non-vapor tight tank used in test 2. These tests confirm results of other tests which show that the first essential in reducing evaporation losses is the making of tanks vapor-tight. They also indicate that vapor-tight cooling systems are not warranted unless tanks are vapor tight.

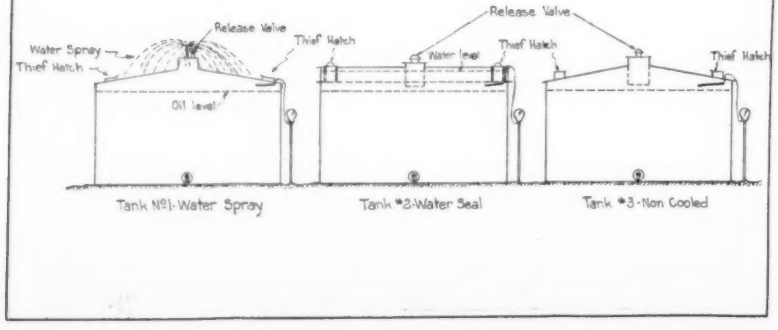
In comparing the two tests the quality of the gasoline used must be taken into consideration. The following distillation record shows that the gasoline used in the non-cooled tank in test 1 was somewhat more volatile than that used in test 2. This also bears out the conclusion that vapor-tight tanks should be used as the tendency for the gasoline to evaporate from the vapor-tight tank in test 1 was greater than in test 2.

Value of Insulation

Different types of insulation have been used on tanks with varying degrees of success. It is doubtful whether insulation alone can be depended upon to reduce temperatures and temperature ranges satisfactorily during the hot summer season in the Mid-Continent fields. The effect of insulation is similar to that of water-cooling systems in that it reduces breathing losses by reducing temperature variation and keeping the surface temperature of the oil as low as possible.

If a tank is plastered over with some insulating materials, for example, asbestos, the tank will act as a thermos bottle. If the liquid being stored in the tank is pumped from exposed tanks in which it may have acquired a high temperature, the insulated tank will tend to keep the liquid at a high temperature. The actual temperature variations in the vapor space may be reduced but not entirely prevented by insulation. Also a tank is subject to conditions. If the gasoline is stored in the tank at a high temperature the

Figure 1



ACID-TAR VALVES

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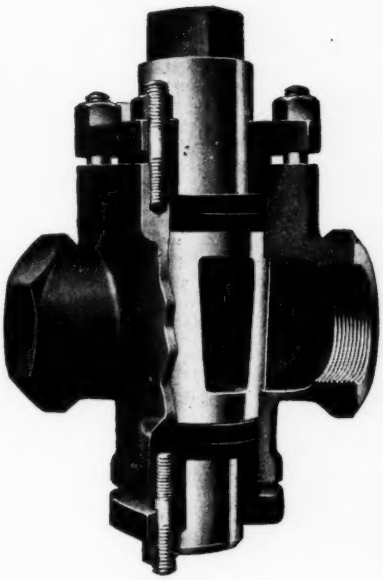

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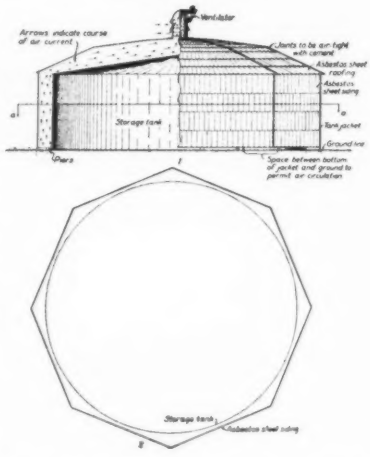
evaporation losses would be reduced a small amount only.

Many tanks are so insulated that there is an air space between the shell of the tank and the insulating material. By means of dampers, cold air may be allowed to flow around the shell of the tank at night in order to cool the liquid and vapor. During the day these dampers may be closed; the insulation keeping out the heat. Such an insulation would be of no value if the insulated tank was not vapor tight, for the draft of air would accelerate the rate of evaporation of the liquid by increasing the rate of renewal of air over the liquid surface.

Some companies insulate the roof and part of the top ring of tanks. If the insulation is properly applied it makes the tank roof vapor-tight and also serves to reduce the temperature of the surface of the liquid and the vapor. During the night the whole tank is subject to cooling by the air, whereas during the day the liquid surface and vapor space is shielded from the direct rays of the sun by the insulation on the roof. At no time during the day would over one-half of the shell of the tank be subject to the direct rays of the sun. It is doubtful if this kind of insulation would be very effective for a working tank or one only partly filled with gasoline.

Figure 3 shows one of the most satisfactory types of insulation used at the present time. The insulation used on this tank is corrugated asbestos sheeting attached to a steel framework, making a complete housing of asbestos over the entire tank. As shown by the sektch considerable space exists between the tank shell and insulation. The housing is open around the bottom and at the top there is a four-foot ventilator for controlling air currents. During the summer months water sprays are placed on the tank under the housing. The air currents ascending from bottom to top cause rapid evaporation of the water film, thus giving an effective cooling action on the tank. The housing also prevents the wind from blowing the spray off the tank. As the tanks thus equipped were in constant service it was not possible to obtain actual evaporation data. As a substitute, recording thermometers were installed in one insulated tank and in one ordinary tank with water spray so as to compare the temperatures and temperature ranges of the vapor space in the two tanks. The temperature records are given in Figure 4 for part of the tests. Condensed temperature for June, July, August and September are shown in Table 7.

FIGURE 3
Tank insulated with sheet asbestos on steel framework



Wiggins, J. H., "Methods of Decreasing Evaporation Losses of Petroleum." U.S. Bureau of Mines Technical Paper 319.

Tank No. 2 was equipped with a water spray. The spray, however, did not function effectively as it was a single spray on the top of a 66,000-barrel tank. A slight wind would blow the spray so that only part of the tank was covered with water. This accounts for the very irregular temperature curve for tank No. 2, shown in Figure 4. On Figure 4 it will be noticed that on one or two days the vapor temperature for tank No. 1 exceeded 95°F. This was due to the water spray being shut off.

In conclusion attention is called to certain important points in connection with cooling systems for preventing evaporation losses of gasoline in storage.

Cooling systems installed on tanks other than vapor-tight tanks are not effective and are believed to be a waste of money.

Water-seal roofs by nature of their

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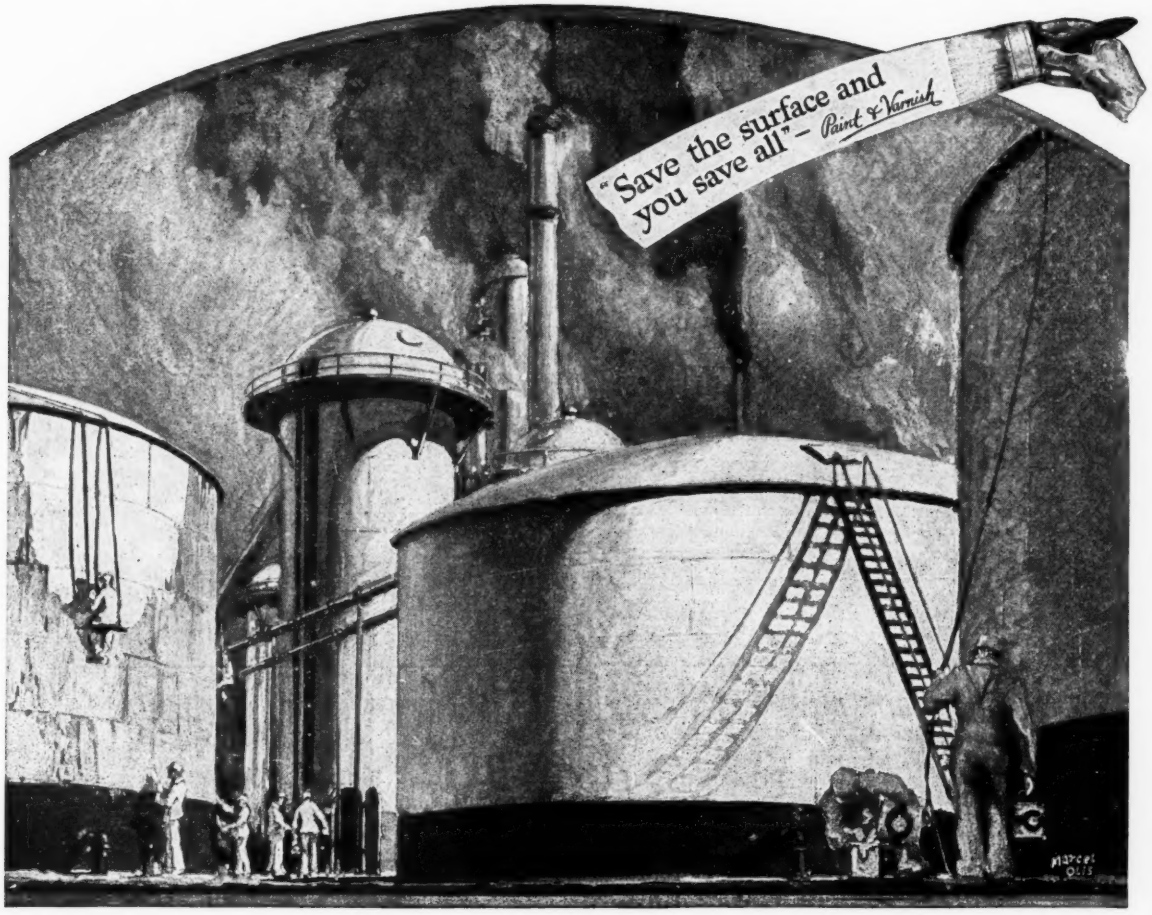

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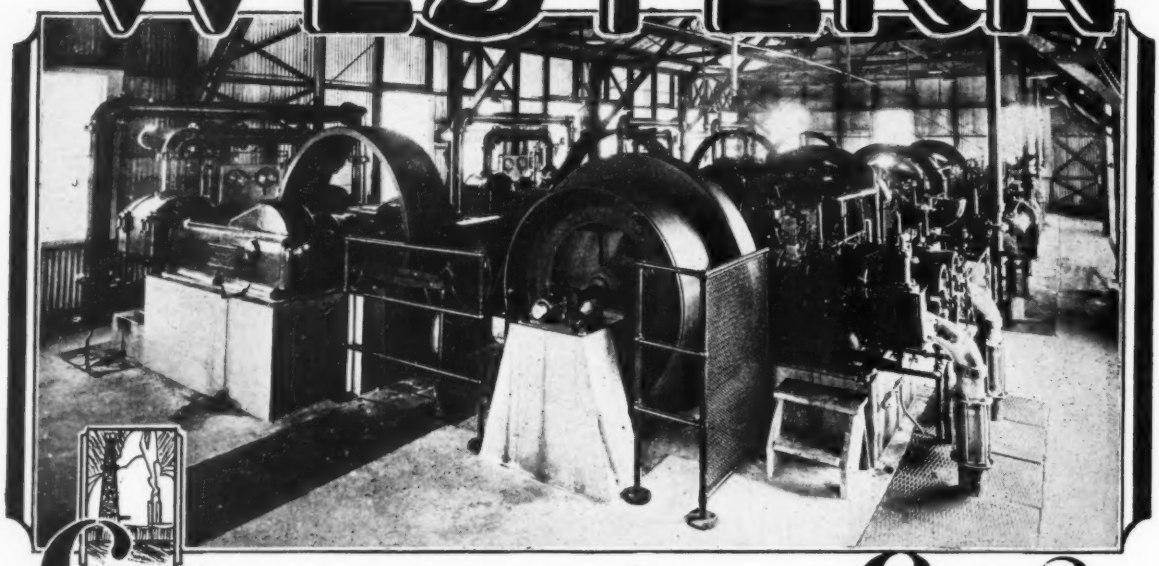

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Low cost of operation is a "built-in" feature of "Western" Engines that has made them the leading power equipment for oil country work for many years in fields where the service is extraordinarily severe and calls for continuous operation for many months at a time with little if any attention.

Actual records of "Western" Engines in such service show common fuel and lubricating economies of from 9338 to 9750 B. T. U. per horsepower hour, and 3,000 to 3,840 horsepower hours per gallon of 23c to 32c oil.

If you are genuinely interested in economical power, backed up by thorough dependability in all kinds of service, investigate "Western" records of performance, operating and maintenance costs.

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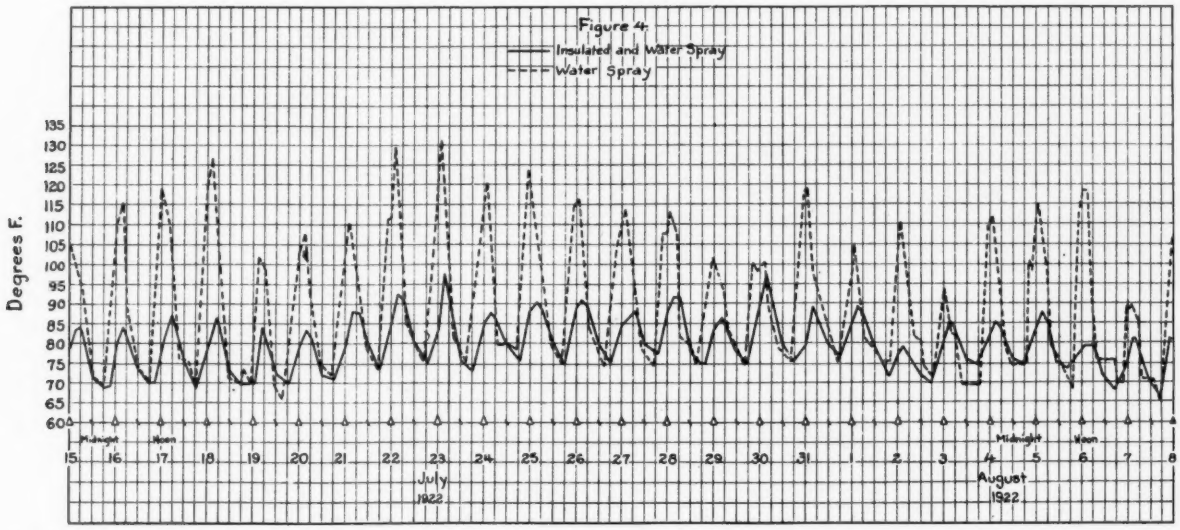

construction insure a vapor-tight roof. The temperature of the vapors within the tank, however, can not be less than the actual temperature of the water circulated over the roof.

Water sprays require a large amount of water but they have a maximum cooling effect. The sides or shell of the tank is also cooled by a water spray. In order to obtain the maximum effectiveness, water sprays should be so placed that wind and air currents will not carry the water from the tank roof, thus wetting one part of the roof only.

Installation for tanks is generally a permanent fixture. The initial cost may be rather high but the operating cost is negligible. If tanks are insulated without an air space, gasoline to be stored in them should be pumped in at the lowest temperature practicable.

It is believed that types of insulation with air space between the insulation and the tank are in general more satisfactory, for gasoline may be cooled in such a tank even though it be pumped in at a relatively high temperature.

The following companies actively cooperated during the field work by which data was obtained for this report: Empire Refining Co., Marland Refining Co., Parkersburg Rig and Reel Co., and the Gantz Tank Co. Mr. O. D. Horn of the Marland Refining Co. and Mr. A. P. Supplee of the Empire Refining Co., assisted with the field work.

T. E. Swigart, superintendent, and N. A. C. Smith, petroleum chemist, of the Bartlesville Station of the Bureau of Mines, assisted in the preparations of the report with valuable suggestions and criticisms. Miss Ruth Brown, draftsman of the Bartlesville station, prepared the drawings. H. P. Rue, I. H. Nelson and L. G. Marsh made the distillations and gravity determinations. —Reports of Investigations, Department of the Interior, Bureau of Mines.

TABLE 5

Results of evaporation test on gasoline in water-spray, and a non-cooled tank.

	Tank No. 1 (Water seal roof)	Tank No. 2 (Ordinary umbrella roof)
June 10, 1922		
Initial gauge net	440.27 Bbls.	437.99 Bbls.
Gravity A. P. I. of gasoline	58.2	59-1
Temperature of oil	93° F.	93° F.
June 20		
Gauge net	438.56	434.57
Gravity A. P. I. of gasoline	58.15	58.9
Loss in gravity of gasoline	.05	.2
Loss of barrels first ten days	1.71	3.42
Average temperature of oil	89° F.	91° F.
July 1		
Gauge net	438.38	432.7
Gravity A. P. I. of gasoline	58.05	58.8
Loss in gravity 2nd period	.05	.1
Loss in barrels 2nd period	.18	2.67
Average temperature of gasoline	87° F.	89° F.
Total loss 20 days in gravity	.15	.3
Total loss 20 days in barrels	1.89	5.29

TABLE 6

Distillation record of gasoline used in tests 1 and 2

	Test No. 1	Test No. 2
Gravity A. P. I.	59.5	58.2
I. P.	112	137
10 per cent	170	202
20 per cent	200	223
30 per cent	222	236
40 per cent	244	252
50 per cent	264	264
60 per cent	290	280
70 per cent	314	302
80 per cent	348	330
90 per cent	390	375
95 per cent	...	404
E. P.	435	444

TABLE 7

Vapor temperatures of tanks equipped with water spray, and combination water spray and insulation

	—June—		—July—		—August—		—September—	
	1 Water Spray Ins'd.	2 Water Spray	1 Water Spray Ins'd.	2 Water Spray	1 Water Spray Ins'd.	2 Water Spray	1 Water Spray Ins'd.	2 Water Spray
Average daily high	90.6	116.5	85.3	110	87.6	111.2	84.4	107.9
Average daily low	71.3	69.5	70.4	71.2	68.9	72.4	61.6	61.6
Average daily variation	19.3	47	14.9	38.8	18.7	38.8	22.8	46.3
Maximum temperature	97	135	98	134	99	125	101	124
Minimum temperature	69	66	64	60	69	64	46	47

500 Barrel Plant Built By Atlas at San Antonio

San Antonio, Texas.—The Atlas Petroleum Corporation has completed and placed in operation a 500 barrel daily capacity skimming plant located on South Brazos street and the Southern Pacific railroad tracks in San Antonio. This plant was originally started by other interests several years ago, but was not placed in operation until Atlas took possession. Crude oil from Luling and Somerset fields, near San Antonio, are used by the plant, which is to be increased in capacity later on, according to an official of the company.

The Atlas Petroleum Corporation maintains headquarters at 707 Frost National Bank building, San Antonio, and the following are officers: L. H. Coursen, president; Eli Howell, vice president; John S. Trowbridge, secretary-treasurer and general manager; and William Levin, plant superintendent.

Denver, Colo.—Work is about completed on the natural gasoline plant of the Carter Oil Company now being constructed in the Salt Creek field in Wyoming.

Wichita, Kans.—Gibraltar Petroleum Company, a new concern, has purchased the refinery of the Frontier Refining Company at Hutchinson, Kansas.

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Field Storage and

THE completion of our new plant enables us to serve the petroleum industry in a much larger way than ever before, particularly in the fabrication and erection of field storage tanks of large capacity.

Biggs' methods of steel plate construction have established our reputation as builders of tanks that are absolutely dependable and satisfactory.

We believe it will be to your interest to let us figure with you on your next requirements in storage tanks of any capacity up to 100,000 barrels.

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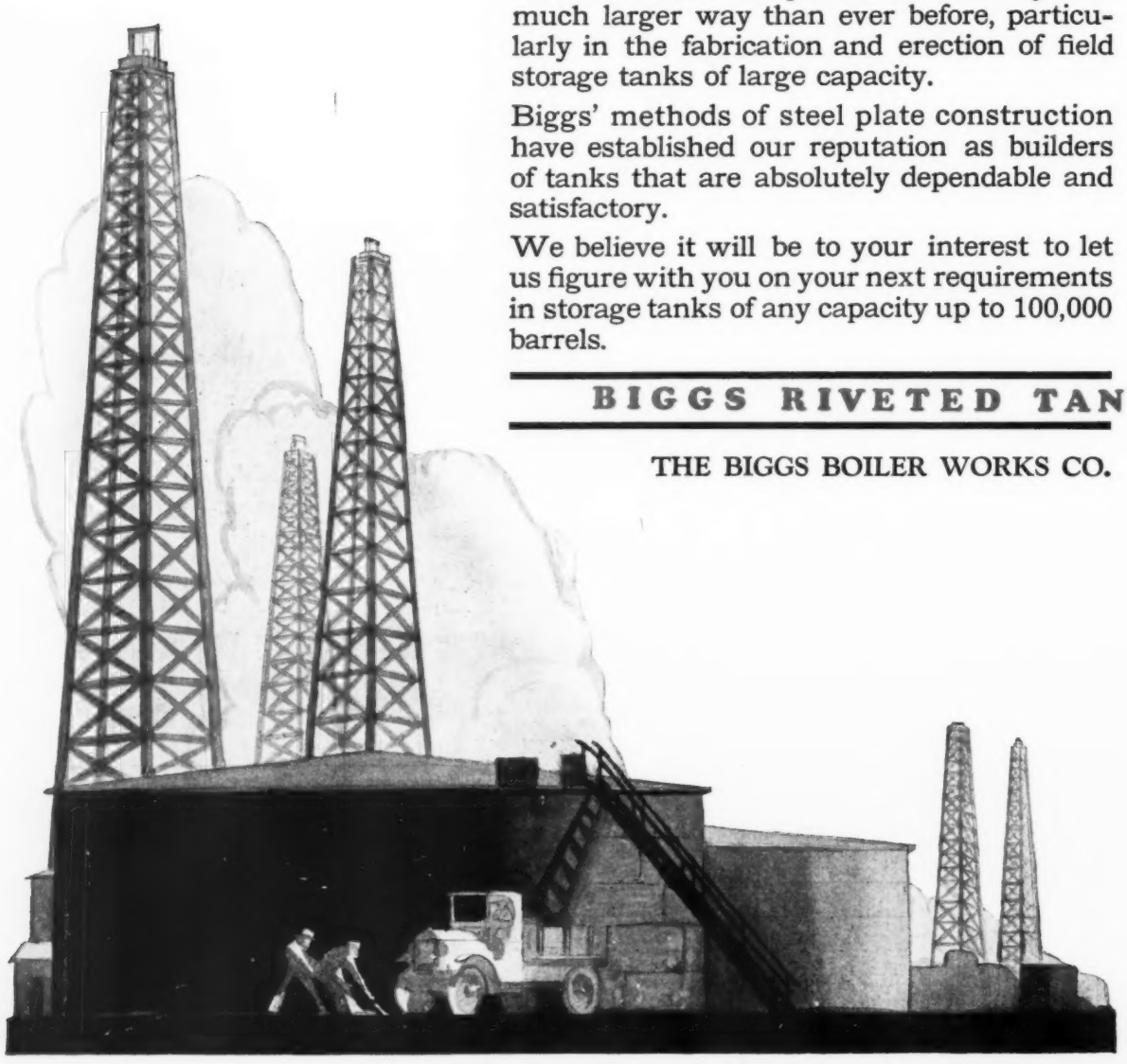

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Thirty-six years' experience in the fabrication of *only high grade* steel plate products, with a plant and equipment of the most complete and up-to-date kind, recommend us to you as good people to deal with. You know that you will get the best that can be had, that the price will be right, and that you will be *permanently* satisfied with your investment.

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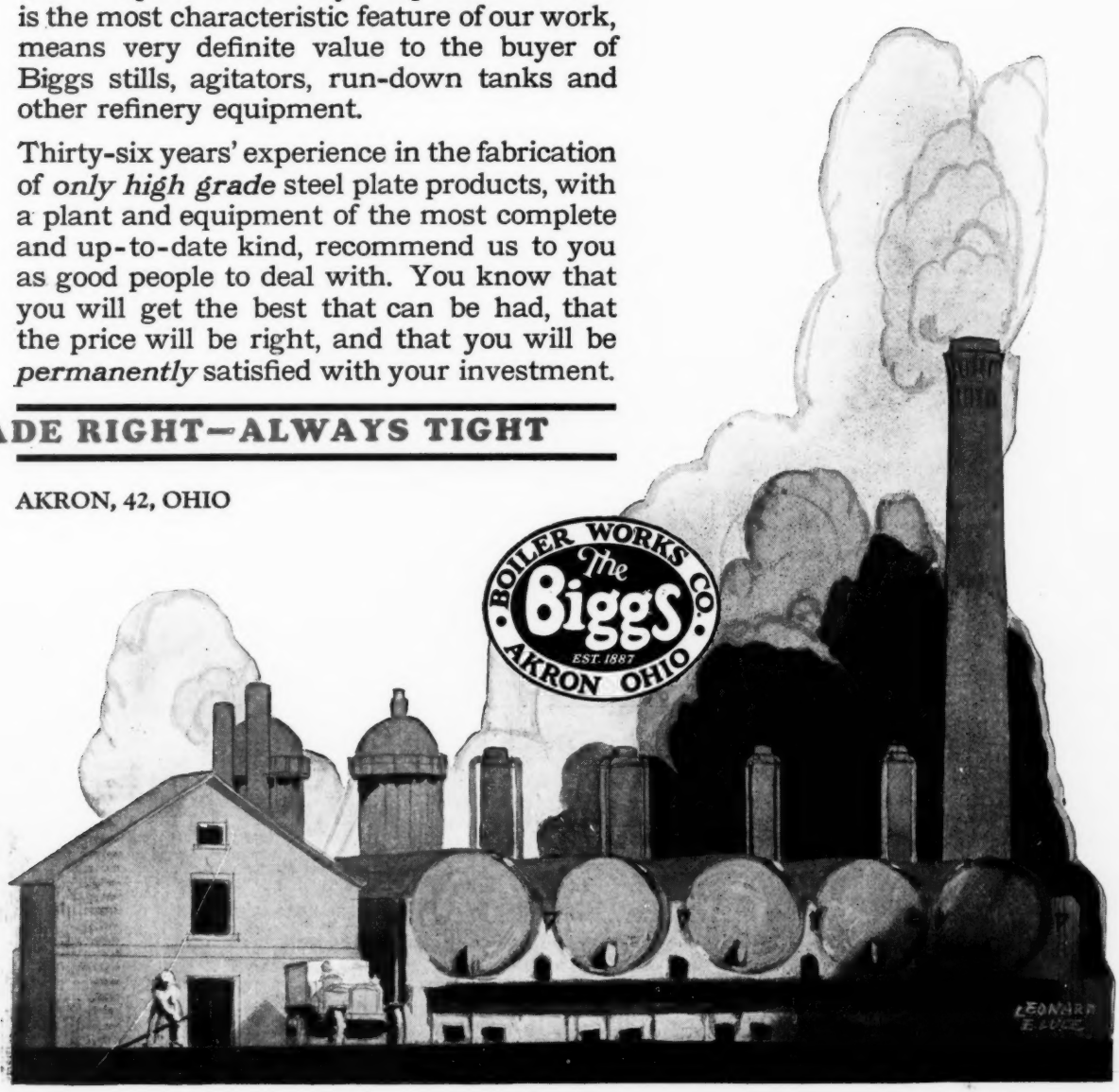

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Industry Overlooking $1,000,000,000 Market

(Continued from page 8)

furnishing a commodity that has a much greater value to the user than it costs the user and the user will not profit but will lose in the long run n every branch of the oil business is not able to maintain itself on a profitable basis.

I am in the oil business for the balance of my life. I want to have the respect and good will of the other men in the business. On the other hand, if I felt I could point out the remedies for our troubles and then could not wake the men of the oil industry up to their responsibilities without insulting them, I am inclined to think I would deliberately insult them. I am not here to defend the accusations made against this, that or the other branch of the business. The bulk of our troubles, however, do not come from these things and the correction of these things would still leave much to be desired.

We are cursed primarily by the fact that the rules for property ownership are different in the production end of the oil business than in any other business in the world and we are likened only to the rulers relating to the ownership of wild animals and birds.

This makes it impossible for us to have vast bodies of oil resources located and large bodies of it blocked out that can be drawn upon as the market demands it. The location of an oil pool means under present conditions that it must be immediately forced upon the market whether the market can take it or not. If there is no market for other mineral products they can be left in the ground. This is not true with oil. We are continually vibrating back and forth between over production of oil and the threat of a shortage of oil with no adequate resources on which to draw to stabilize either our supplies or our prices. Our customers are alarmed at times for fear they will not have a supply and are continually irritated and annoyed by wide fluctuations in price. The man on the street compares our business with every other branch of business and concludes that such fluctuations in prices can only result from either mismanagement or manipulation.

Resources Drained Regardless

Our ground resources of oil are drained as rapidly as physical conditions will permit regardless of whether the markets will take the oil or not, and we have absolutely no ground supplies blocked out that can be drawn upon at will as it is the case with all other mineral products and this in spite of the fact that over ground storage of oil costs more and leads to greater waste than any other mineral product.

During the past few years we have often seen oil sell for less than the cost of storage and while above ground storage beyond a minimum amount should not be encouraged nevertheless even under present conditions when ground reserves are impossible storage above ground to any great extent is economically impossible.

Until our laws can be changed to put us on an even footing with all other forms of property we must contend with this inability to control production except over wide ranges, but nevertheless even operating under this handicap we can better things immensely.

We are burning now every day more than 1,000,000 barrels of oil much of which is sold for purposes for which coal—which is more or less abundant—would be equally available; and this 1,000,000 barrels of daily consumption used in many cases in strict competition with coal offers the elastic factor which warrants us in developing all of the superior uses of oil where it has a greater value over other forms of fuel.

Tired of Overproduction

I for one am tired of seeing a period of overproduction occur and then have everybody sit down and wait for something to happen. There may be a special providence for old women little children and drunken men but there seems to be none for the oil business. What we need is less wind and more work, less talk and more thought, less bellyaching and more brain effort, less bile and more guts.

The American Petroleum Institute has recently appointed two important committees, one to consider changes in our methods of producing oil so that the evils now existing in this branch of our business can be eliminated and especially so that oil will not be forced on the market beyond the ability of the market to take it. The other important committee relates to the matter of the utilization of petroleum products. In spite of the fact that no one openly challenges my statement that we should be able to sell all the oil we are now producing and receive a revenue of at least $1,000,000,000 a year in excess of what we are now receiving, nevertheless the leaders in the business feel that the

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Ask the Continental Supply Company about TNEMEC paint.

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industry would not be willing to spend even a single penny of each $100 of this huge opportunity. Many of the industries much smaller than the oil industry and with relatively much smaller resources contribute and spend collectively aside from what each company spends in the different sales departments, hundreds of thousands of dollars every year—yes, in some cases millions of dollars every year. The petroleum industry of giant size and with unlimited opportunity spends next to nothing.

My fellow members of the Committee of Utilization of Petroleum Products advised against even asking the industry for an appropriation of $100,000 a year to spend on this work and felt that the industry would not listen sympathetically to the request for more than $50,000.

One per cent of $1,000,000,000 a year would be $10,000,000 and $100,000 a year would only be one one-hundredth of one per cent or $1.00 for each $10,000, or one penny for each $100.

There are many industries where no one company can afford to develop new uses for the product of the industry. I have used frequently the distinction between a gas company selling gas for, say, industrial purposes and an oil company selling oil for industrial purposes. I happen to be in both the gas business and the oil business. In the gas business we can afford to maintain a highly efficient and therefore an expensive organization. We can also afford to maintain a highly efficient and therefore expensive engineering organization for the purpose of developing new uses and new applications for gas. We can afford to not only convert the manufacturer by the work of our salesmen to the use of gas as against other fuel, but we can afford to have our engineering organization design, build and supervise the initial operation of special furnaces designed by us to suit the needs of our customers. We can afford to do this because once this customer is connected to our gas mains he has no other source from which to buy his fuel.

I have shown many of the men in the oil business that we find no difficulty in selling gas at a price which would be equivalent to from fifteen cents to thirty cents a gallon for fuel oil and there is no difficulty in showing that much more oil could be sold than gas, but no one company can afford to furnish the salesmanship and the engineering to develop these uses and applications for oil for as soon as the customer is in position to shop with every other oil company in the country and whether he shops for oil or not, a good many of the other oil companies will be around to try and sell him oil; therefore this work must be done by the industry as a whole and cannot be done on any large scale by any individual company.

Taking what would be perhaps a representative, although a very conservative, figure as the amount expended by many of the gas companies and applying this expenditure to the oil business for the entire country, it would amount to considerably more than $10,000,000 a year, and it pays, and this is an indication of what it would pay the oil companies to do.

One of the Cement organizations representing an industry much smaller than ours expended last year collectively more than $3,000,000, and I understand they are expending this year in excess of $5,000,000.

The oil industry except for certain individual efforts—which are almost negligible—does not attempt to either develop new uses for oil nor to extend the application of these uses. It merely supplies oil for uses developed by others. Do we simply lack vision or are we just plain pikers?

Our industry is periodically threatened with bankruptcy for lack of ability to sell the oil produced, and yet the total quantity of oil produced is puny in comparison with the total fuel needs of the entire country.

We can foresee uses for oil that would absorb $1,000,000,000 a year in excess of what we now produce and yet what we can foresee is practically small compared with what might be realized if we were to put on an intensive sales campaign.

If every man in this room were to sit down now and list all of the uses for oil which he can foresee at this time we would by an intensive sales campaign undoubtedly develop twice as many uses as the entire list we could now collectively make up.

For every dollar that the entire oil industry has ever expended in its entire history for developing the utilization of oil, there has probably been spent during the past year more money by manufacturers on the development of house heating burners than the en-

(Continued on page 36)

Why Buy Tank Cars

More Economical to Lease

At the present leasing prices, it is a decided economy to lease and not buy tank cars.

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To say that leasing cars is more economical would prove nothing. But to compare your cost of upkeep with North American rental charges would be positive proof.

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LESSORS OF TANK CARS

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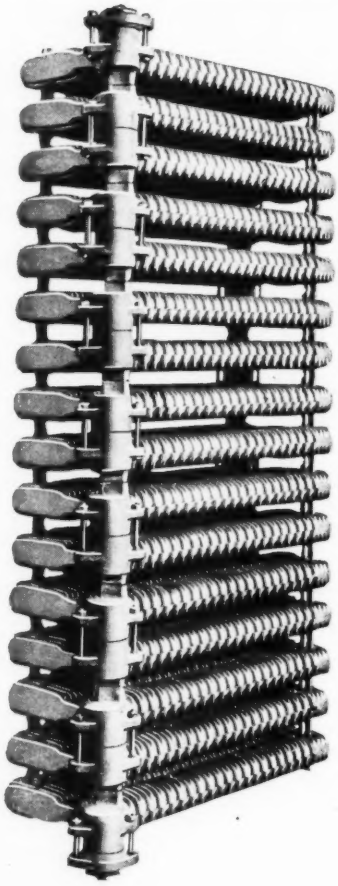
The growing acceptance of Sterling Sections — both in gas absorption and in oil refining—has been due to these outstanding points:

Sterling Sections are cheaper to install, they condense at a more rapid rate, eliminate back pressure in the stills, last long, and any section can be quickly removed for cleaning or other purposes.

One of our engineers will be glad to call upon you and give you full information concerning Sterling Condensing Sections. Simply write your name and address on the margin of this page and send it to us. This involves no obligation on your part.



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Condensing boxes belonging to the Globe Oil and Refining Company, Blackwell, Oklahoma, where Sterling Condensing Sections are meeting every requirement.

PERSONNEL OF THE INDUSTRY

Sales, order and traffic offices of the Indian Refining Company have been removed from New York to Lawrenceville Illinois, where the company's general offices will be located after January 1.

E. R. Ratcliff has resigned as president of the Invincible Oil Corporation and the Louisiana Oil Refining Corporation and has been secceeded by Richard B. Kahle of Shreveport, Louisiana.

Harry Leon, representative of the Fairbanks Valve Company of Philadelphia, completed a tour of the Mid-Continent refining area during November.

A. E. Watts, vice president and director of Sinclair Consolidated, has been elected chairman of International Barnsdall, succeeding Robert Law, Jr., of Boston.

H. R. KINGSBURY,
President of the Standard Oil Company of California, the largest refining company on the West Coast

C. P. McKeizer, representative of the Western Iron and Foundry Company, was away from his office in Wichita, Kansas, recently on a trip through the Oklahoma refining field.

W. K. Sparks, representative for the southern district for Truscon Steel Company with offices at Mobile, Alabama, was in the Mid-Continent field during November.

Victor H. Smith, vice president of the Lion Oil and Refining Company, now has his office located in the Armstrong building in El Dorado, Arkansas, having removed from Kansas City.

J. C. McDonald, president of the Standard Oil Company (Kansas), was away from his headquarters at Neodesha, Kansas, last month on a business trip to Tulsa.

Albert H. Fay of Washington, petroleum and mining engineer and former chief of the national resources division of the United States Treasury Department, has resigned to engage in private enterprise.

L. Z. Harrison of the Tower Gasoline Company has returned to the company's New York offices in the Equitable building after an extended stay in Oklahoma City and other Mid-Continent refining centers.

S. R. Scivally, manager of the Tulsa, Oklahoma, offices of Sinclair Refining Company, is spending several weeks at Hot Springs, Arkansas, in the interest of his health.

W. L. Kistler, president of Producers and Refiners Corporation, has returned to Chicago after a visit through the Oklahoma territory.

H. L. Pollvogt, president of the Pollvogt Gasoline Company, has returned to his home in St. Louis after a trip through the Mid-Continent refining field.

H. R. Leland has been appointed district representative at Tulsa, Oklahoma, for the Columbian Steel Tank Company of Kansas City.

George N. Moore, president of the Moore Refining Company, has returned to Chicago after a visit at Arkansas City, Kansas, and Tulsa and other points.

B. F. Rice, general manager of the Pierce Oil Corporation of New York, is touring the eastern, middle western, southwestern and Rocky Mountain regions.

M. G. Billingslea has been named sales manager of the White Star Refining Company. He formerly was secretary of the Indian Refining Company at Lawrenceville, Illinois.

Division sales office for the intermountain region of Producers and Refiners Corporation will be located in the Desert National Bank building at Salt Lake City, Utah, with M. C. Bradshaw in charge.

Henry H. Brigham of Chicago, president of the North American Car Company, is visiting in Oklahoma and Texas refinery points.

J. P. Jones, superintendent of the Roth Gasoline Corporation of Independence, Kansas, was in Tulsa the first part of December on a business mission.

C. C. Lakin has been named manager of the asphalt and road oil department of the Standard Oil Company (Indiana) with headquarters in Chicago.

F. W. Fraley, vice president of the Sinclair Refining Company of Louisiana, left Houston for an extensive trip to Chicago and the Eastern territory. He will return the latter part of this month

Donald Gaither of Tampico, Tamps, is spending a few days in Houston, Texas, preparatory to returning to Mexico City, where he will take over the distribution of Sinclair products in Mexico.

John L. Halyburton, engineer and sales manager of the valve department of the American Car and Foundry Company, with headquarters at Berwick, Pennsylvania, was in Houston on business during the past month.

New York, N. Y.——The Silica-Gel Corporation has closed a deal with the Vacuum Oil Company for a refining plant at Paulsboro, New Jersey ,with a capacity of 5000 barrels daily. The silica-gel process will be utilized.

Wichita, Kans.—A movement has been started among Kansas refiners, which, if successful, likely will result in the elimination of discrimination in freight rates on oil products and the re-establishment of the former differential in effect between Kansas and Oklahoma points.

Denver, Colo.—Mutual Oil Company refining headquarters as well as the producing and marketing divisions will be removed to Denver from Kansas City.

London, Eng.—Dutch-Shell interests have underbid the British Mexican Petroleum Company in obtaining a renewal of the contract for supplying fuel oil to the Cunard Steamship Company at British ports.

RECENT REFINERY PATENTS ISSUED

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the oil refining industry have been recently issued by the United States Patent Office at Washington:

Making Oils Non-sludging

No. 1,472,882, issued on November 6 to Herbert Raymond Moody, of New York, N. Y., on a process of making oils nonsludging. It comprises the step of treating oil with nascent hydrogen, at a comparatively low temperature so that no cracking of the oil takes place, whereby the hydrogen converts the sludge-forming constituents of the oil into non-sludge-forming constituents.

Converts Boiling Oil

No. 1,473,316, issued on November 6 to George L. Prichard and Herbert Henderson, assignors to Gulf Refining Company, Pittsburgh, Pa., a corporation of Texas. The patent covers the method of converting higher boiling oils into lower boiling oils which comprises establishing and maintaining a boiling body of higher boiling oil and aluminum chloride, conducting vapors of lower boiling oils formed away from such body, and supplying additional high high boiling oil substantially in liquid form to said body at a temperature higher than the boiling point of the body.

New Process

No. 1,473,402, on a process of refining oil, issued on November 6 to Chauncey Blair Forward, Urbana, Ohio. The patent covers a process of refining oil, consisting in passing a thin body of oil for a short interval through the waste heat discharged from a steam boiler furnace, the temperature of the waste heat and duration of application being limited to prevent cooking or burning of any part of the oil, and secondly, in applying the steam from the same boiler to the heated oil until a higher degree of temperature of the oil is obtained, and finally separating the lighter and heavier portions of the heated oil.

Distills Shale

No. 1,473,616, issued on November 13 to Claude M. Garland, Chicago, Ill., on a retort for the distillation of shale, bituminous coal, and other materials. The patent relates to a retort comprising a substantially horizontally arranged cylindrical retort ,a charging device located near one end of the said retort, a discharging device located near the opposite end of said retort, a false head near the discharge end of the said retort, an aperture for the dicharge of material located in the said false head and a gate for varying the opening of the said aperture.

Removing Olefines

No. 1,474,136, on a process of treating oils, issued on November 13 to Frederick W. Bayard, Chester, Pa., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware. The patent covers the process of removing olefines and other unsaturated compounds from a coal tar distillate composed chiefly of the aromatic hydrocarbons benzol, tuluol and solvent naphtha, while avoiding great loss of aromatic hydrocarbons, which comprises washing said distillate with dilute sulphuric acid from about 70 to 75 per cent strength to form a sludge acid containing tar, allowing the mixture to settle, and separating the sludge acid from the mixture of aromatic hydrocarbons.

Uses Upright Tubes

No. 1,474,147, issued on November 13, to John Lathrop Gray, of Elizabeth, N. J. The patent relates to an apparatus for the refining of petroleum, comprising a series of upright tubes, said tubes being provided with a filling of molten material, injectors for the petroleum, said injectors discharging into the low-

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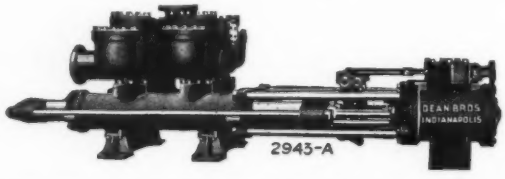

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er ends of the tubes and forming a continuation thereof of relatively small bore, means for congealing that part of the molten material that finds its way into the injectors, means for re-melting the congealed material, and means for creating a petroleum pressure in the system back of the several injectors so that on said re-melting of the petroleum will immediately rush into the injectors and on into the main body of molten material above; substantially as described.

Refining Apparatus

No. 1,474,395, issued on November 20 to Cornelius B. Watson, Columbus, Ohio, on a petroleum refining apparatus. It comprises a horizontally extending elongated drum having a flat bottom, arranged to receive a body of substantially molten metal, a dome arising from said drum, a nozzle structure positioned in said dome, mean for circulating said metal from the bottom of said drum through said nozzle structure, means for passing petroleum centrally through said nozzle structure and into physical engagement with said metal as the latter issues from the discharge end of said nozzle structure, a supplemental reservoir arranged within said drum and located beneath said nozzle structure for the reception of said metal, and means for maintaining the level of the metal within said reservoir at a predetermined height.

Treating Oils

No. 1,474,475, on a method of treating petroleum, issued on November 20 to Daniel W. Hoge, assignor, by mesne assignments, to Bash Oil and Refining Company, Chicago, Ill., a corporation of Delaware. It covers the methods of obtaining gasoline which consists in vaporizing heavy hydrocarbon oils, causing the vapor to flow slowly at low pressure through and in contact with the walls of a conduit having relatively great length with respect to its cross-sectional area, causing the vapor to frequently and abruptly change its direction of flow through said conduit to prevent the formation of carbon, and heating the walls of the conduit to a temperature sufficiently high to break down the high boiling point compounds of the vapor as it passes through the conduit in contact with the heated walls thereof.

Separator

No. 1.475,028, issued on November 20 to William J. Reilly, Denver, Colorado, on an apparatus for separating oil from oil-bearing sands and rocks. It comprises, in combination, a vertically arranged substantially cylindrical still member adapted to contain oil, a supporting framework within said still, a pair of bearings supported by said framework, a shaft rotatable in said bearings, means for rotating said shaft, a grinding element non-rotatably secured to the upper end of said shaft, a second grinding element rigidly secured to said framework, means for introducing the oil-bearing rock to said still and between said grinding elements, and a heating coil located within said still below said grinder.

Distilling Hydrocarbons

No. 1,475,901, issued on November 27 to Carey W. Thompson, Denver, Colo. It relates to an apparatus for the distillation of hydrocarbons, including an elongated retort, a chamber therein containing a conveyor, a heat chamber under a part of said conveyor, said conveyor increasing in diameter from a point over the beginning of the heat chamber to a point intermediate the beginning and end of said heat chamber, said conveyor being of uniform diameter for the remainder of its length, said conveyor chamber having an enlarged portion above the conveyor and a series of ports leading to a take-off above the chamber, said take-off communicating with that portion of the conveyor chamber not over the fire chamber.

Treating Vapor

No. 1,474,476, on a method of treating petroleum vapor, issued to November 20 to Daniel W. Hoge, assignor to Bash Oil Refining Company, Chicago, Ill., a corporation of Delaware. It covers a method of treating vapor of petroleum or heavier fractions thereof which comprises, conducting the vapor under a pressure sufficiently only to cause the vapor to advance through a reaction zone of relatively great length and small cross sectional area, maintaining the vapor during its passage through said reaction zone at a substantially uniform temperature between 650 degrees F. and 1,100 degrees F. sufficient to break down compounds having high boiling points into compounds having relatively low boiling points, subjecting the stream of vapor during its movement through said reaction zone to successive abrupt impingements, and permitting the vapor to flow unobstructedly through the reaction zone portions lying between the successive points of impingement.

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Mid-Continent Refinery Operations

As of December 5, 1923

ARKANSAS

Plant and Location	Capacity	Now running
Abner Davis, El Dorado	60	SD
Airedale Ref. Co., El Dorado	1,000	SD
Arkansas Ref. Co., Fort Smith	1,000	SD
Ouachita O. & R. Co., El Dorado	1,000	525
El Dorado Pipe Line & Ref. Co., El Dorado	2,000	SD
Farmer Oil & Ref. Co., Texarkana	1,000	SD
Four States Ref. Co., Texarkana	400	SD
Griscon Ref. Co., El Dorado	750	180
Home Ref. Co., Hot Springs	500	125
Jones Bros. & Tatum, El Dorado	1,000	SD
Kettle Creek Ref. Co., Pearson	2,000	2,550
Lion Oil & Ref. Co., El Dorado	12,000	7,450
Newark Ref. Co., El Dorado	1,500	SD
Pine Bluff Ref. Co., Pine Bluff	1,500	450
Root Refineries, El Dorado	3,000	2,200
Shippers Pet. Co., El Dorado	1,800	SD
The Arkansas Ref. Co., Picron	3,000	SD
Union P. L. & Ref. Co., El Dorado	4,000	SD
Total for Arkansas	36,960	

KANSAS

Plant and Location	Capacity	Now running
Associated P. & R. Co., Eldorado	1,000	SD
Bell P. & R. Co., Eldorado	700	SD
Commonw'lth O. & R. Co., Moran	800	150
Derby Oil & Ref. Co., Wichita	5,000	1,760
Chemical O. & G. Co., Osawatomie	1,000	SD
Eldorado Ref Co., Eldorado	4,000	2,300
Frontier Ref. Co., Hutchinson	2,000	SD
Golden Rule Ref. Co., Wichita	800	800
Great Western Pet. Co., Florence	2,000	SD
Great Western Ref. Co., Erie	1,500	SD
Industrial Ref. Co., Eldorado	1,500	SD
Kanotex Ref. Co., Arkansas City	3,000	2,600
Kansas City Ref. Co., Kansas City	5,000	4,400
Kansas Oil Ref. Co., Coffeyville	2,000	400
Kansas Texas O. R. Co., Wichita	1,500	SD
Interstate Ref., Inc., Centropolis	1,600	SD
Lesh Ref. Co., Arkansas City	1,500	SD
The Grant Oil Co., Augusta	2,500	560
Skelly Oil Co., Eldorado	12,000	8,040
Mutual Oil Co., Chanute	1,500	SD
Mecca Ref. Co., Augusta	2,500	SD
Marshall & Co., Sheffield	2,500	SD
Moore Ref. Co., Arkansas City	4,500	2,500
McCree Pet. Co., Baxter Springs	600	SD
McWhorter-Chanute Ref. Co., Chanute	200	SD
Miller Pet. Co., Humboldt	1,500	1,500
National Ref. Co., Coffeyville	5,000	4,700
North American Ref. Co., Rosedale	700	SD
Peerless Oil & Ref. Co., Chanute	3,000	2,300
Richardson Ref. Co., Eldorado	2,000	400
Red Bird Ref. Co., Fredonia	800	SD
Sinclair Ref. Co., Argentine	6,000	6,000
Sinclair Ref. Co., Coffeyville	7,000	5,540
Sterline Oil & Ref. Co., Wichita	5,000	1,770
Standard Oil Co. (Kansas), Neodesha	12,000	SD
Uncle Sam Oil Co., Argentine	700	SD
Uncle Sam Oil Co., Cherryvale	2,400	SD
Vickers Pet. Co., Potwin	1,800	1,600
White Eagle Ref. Co., Augusta	6,500	5,080
Total for Kansas	117,200	

LOUISIANA

Plant and Location	Capacity	Now running
Caddo Central Oil & Ref. Co., Shreveport	3,500	3,500
Caddo Central Oil & Ref. Co., Shreveport	7,000	4,250
International Oil & Gas Co., Cedar Springs	800	SD
Homer Ref. Co., Homer	250	SD
Leeton Ref. Co., Shreveport	1,000	SD
Louisiana Pet. Prod. Co., Bossier	6,000	SD
Louisiana O. & R. Co., Shreveport	6,000	5,750
Red River Ref. Co., Crichton	1,800	SD
Paramount Pet. Co., Superior	3,000	SD
Rogers Ref. Co., Shreveport	1,500	SD
Shreveport Oil & Ref. Co., Shreveport	4,500	3,600
Tar Island Ref. Co., Mooringsport	300	SD
The Texas Co., Arlda	5,000	*5,000
Union Ref. & P. L. Co., Oil City	1,000	SD
Union Ref. & P. L. Co., Homer	1,000	SD
Total for Louisiana	48,650	

*Topping.

MISSOURI

Plant and Location	Capacity	Now running
Wilhoit Ref. Co., Joplin	2,000	1,050
Standard Oil Co. (Indiana) Sugar Creek	12,000	6,850

OKLAHOMA

Plant and Location	Capacity	Now running
Acme Ref. & P. L. Co., Jennings	2,000	SD
Allied Ref. Co., Okmulgee	2,000	1,250
Associated P. & R. Co., Yale	1,000	SD
Barnsdall Ref. Co., Barnsdall	3,000	3,200
Bay State Ref. Co., Healdton	1,000	SD
Beaver P. & R. Co., Dilworth	700	SD
Big Six Ref. Co., Sapulpa	3,000	SD
Bison Ref. Co., Quay	1,000	SD
Blue Ribbon Ref. Co., Walters	500	SD
Bolene Ref. Co., Enid	3,600	3,600
Bristow Gaso. & Sup. Co., Bristow	400	SD
Buffalo Ref. Co., Yale	1,000	SD
Cushing Ref. Co., Cushing	1,000	SD
Cameron Ref. Co., Ardmore	3,500	2,900
Canfield Ref. Co., Yale	500	100
Carter Oil Co., Cartoco	12,000	SD
Champlin Ref. Co., Oilton	1,000	2,300
Chestnut & Smith Corp., Sand Springs	5,000	SD
Chas. F. Noble Oil & Gas Co., Oklahoma City	2,000	SD
Coleman-Nelson Corp., West Tulsa	2,000	SD
Coleman-Nelson Corp., Haskell	1,000	SD
Constantin Ref. Co., Devol	10,000	SD
Constantin Ref. Co., West Tulsa	4,500	SD
Cosden & Co., West Tulsa	35,000	20,800
Cushing Ref. & Gaso. Co. Blackwell	2,500	350
Cushing Ref. & Gaso. Co. Cushing	2,500	1,500
Anderson & Prichard Oil Corp Oklahoma City	800	760
Daisy Bell Pet. Co., Wilson	2,000	500
Damascus Ref. Co., Lawton	1,500	SD
El Dorado Ref. Co., Yale	700	SD
Equality Ref. Co., Oilton	1,000	SD
Empire Refs. Inc., Cushing	5,000	3,000
Empire Refs. Inc., Okmulgee	2,500	2,450
Empire Refs. Inc., Okla. City	2,500	SD
Empire Refs. Inc., Ponca City	4,500	3,600
Francis Ref. Co., Francis	5,000	SD
Frederick Ref. Co., Frederick	5,000	SD
Fairmont Ref. Co., Fairmont	2,500	SD
Federal Oil & Ref. Co., Cushing	1,500	SD
Globe Oil & Ref. Co., Blackwell	4,000	900
Gilmer Oil Co., Ringling	800	SD
Golden Belt Ref. Co., Okla. City	200	SD
Grandfield O. & R. Co., Grandfield	3,000	SD
Hewitt Ref. Co., Hewitt	1,600	1,200
Home O. & R. Co., Yale	2,000	SD
Indian Chief Ref. Co., Cushing	1,800	SD
Loraine Pet. Co., Bristow	2,500	1,800
Imperial Ref. Co., Ardmore	6,000	6,100
Indiahoma Ref. Co., Okmulgee	9,000	SD
Illinois Oil Co., Cushing	3,000	550
Inland Ref. Co., Cushing	3,000	SD
Johnson Oil Ref. Co., Cleveland	2,500	2,850
Lawton Ref. Co., Lawton	1,100	SD
Local Ref. Co., Okla. City	1,000	480
Marland Ref. Co., Ponca City	12,000	7,030
Marland Ref. Co., Covington	1,000	SD
Maud O. & R. Co., Maud	400	SD
Mecca Ref. Co., Allen	1,600	400
Meridian Ref. Co., Okmulgee	3,000	SD
Meridian Ref. Co., Hominy	1,000	SD
Meridian Ref. Co., Ponca City	2,500	SD
Mid-Co. Pet. Co., West Tulsa	7,000	SD

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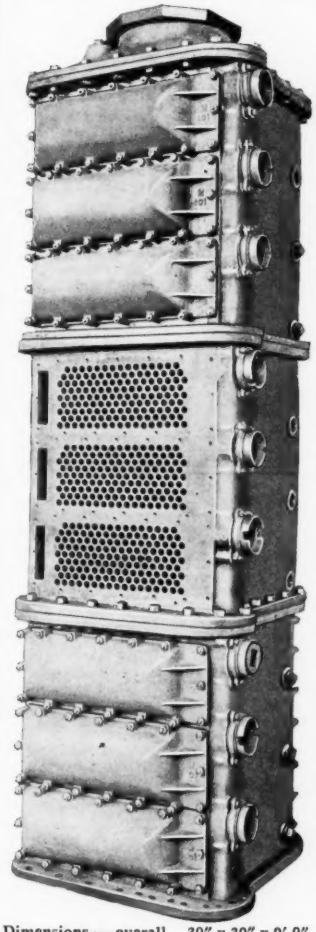

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Los Angeles, Calif.

Plant and Location	Capacity	Now running
Navajo Ref. Co., Sapulpa	1,500	520
North Amer. Ref. Co., Pemeta	1,500	SD
Nyanza Ref. Co., Wilson	3,500	700
Oil State Ref. Co., Enid	2,500	500
Pontotoc Pipe Line & Ref. Co., Allen	1,500	SD
Omar Ref. Co., Garber	2,500	1,360
Oklahoma P. & R. Co., Muskogee	2,500	SD
Pawhuska Ref. Co., Pawhuska	1,000	SD
Waite Phillips Co., Okmulgee	4,000	3,540
Pierce Oil Corp., Sand Springs	9,000	4,300
P. & R. Corp., Blackwell	2,500	1,700
P. & R. Corp., West Tulsa	6,000	4,300
Pure Oil Co., Ardmore	7,000	3,200
Pure Oil Co., Cushing	6,500	5,800
Pauline Ref. Co., Hampton	1,200	700
Powerine Oil Co., Billings	500	SD
Pioneer Pet. Co., Guthrie	2,500	SD
Sheridan Ref. Co., Newkirk	2,000	SD
Santa Fe O. & R. Co., Ardmore	5,000	SD
Rock Island Ref. & P. L. Co., Duncan	1,200	980
Shaffer O. & R. Co., Cushing	6,500	5,720
Sapulpa Ref. Co., Sapulpa	7,000	SD
Southern Oil Corp., Yale	6,000	SD
Southern Oil Corp., Walters	2,500	SD
Sun Company, Yale	4,500	2,470
Southwestern Oil Corp., Enid	1,800	SD
Sinclair Ref. Co., Cushing	5,500	6,030
Sinclair Ref. Co., Muskogee	2,000	740
Sagimore Oil Corp., Grandfield	2,000	1,500
Texas Co., West Tulsa	8,000	7,700
Tide Ref. Co., Drumwright	4,500	1,800
Tex. Pe. C. & O. Co., Wynnewood	1,500	1,900
Travis Senter Ref. Co., Comanche	1,500	640
Grandfield O. & R. Co., Grandfield	2,500	SD
Transcontinental Oil Co., Boynton	2,500	1,560
Transcontinental Oil Co., Bristow	5,000	4,350
Turley Ref. Co., Oklahoma City	2,500	250
Tonkawa Ref. Co., Tonkawa	1,000	110
Union O. & R. Co., Grandfield	2,000	SD
Wagoner Ref. Co., Wagoner	500	SD
Wilcox Ref. Co., Bristow	500	SD
Yale Oil Corp., Yale	1,200	780
Oklahoma total	353,900	

TEXAS

American Oil Corp., Pioneer	2,500	550
American Ref. Co., Wichita Falls	5,000	5,250
H. E. Boner, Burkburnett	700	300
The Petroleum Corp., Electra	2,000	800
Buffalo Ref. Co., Sherman	500	350
Burk-Texas Ref. Co., Burkburnett	1,200	SD
Bear Ref. Co., Burkburnett	1,200	SD
Clayton O. & R. Co., Dallas	3,500	1,800
H. H. Cross Ref. Co., Corsicana	2,000	1,100
Crystal Pet. Co., Burkburnett	1,000	SD
Eastland-Pioneer O. & R. Co., Cisco	1,000	SD
Empire Refs. Inc., Gainsville	7,000	3,600
General Refs. Inc., Abilene	1,500	SD
Gulf Ref. Co., Ft. Worth	15,000	5,800
Gorman Ref. Co., Gorman	1,000	SD
Griswold Ref. Co., Electra	2,000	1,750
Humble O. & R. Co., Burkburnett	1,500	1,150
Invincible Oil Corp., Ft. Worth	5,000	SD
Interstate Gaso. Co., Iowa Park	2,000	1,000
Iowa Park P. & R. Co., Iowa Park	1,000	SD
Keystone Ranger Ref. Co., Wichita Falls	2,000	SD
Lone Star Ref. Co., Wichita Falls	4,000	SD
Manhattan Pet. Prod. Co., Wichita Falls	2,500	SD
Megargel Oil & Ref. Co., Megargel	500	SD
Miller Pet. Co., Wichita Falls	2,500	1,800
Mexia O. & R. Co., Mexia	600	SD
Magnolia Pet. Co., Ft. Worth	12,500	5,600
Noble O. & G. Co., Burkburnett	5,000	3,000
Nortex Ref. Co., Burkburnett	2,000	SD
North Texas Ref. Co., Greenville	1,000	SD
Owenwood Oil Corp., Burkburnett	2,000	SD
Oriental Ref. Co., Dallas	5,000	800
Oddessa Ref. Co., Ranger	1,000	SD
Orient Pet. Co., Wichita Falls	2,000	400
Pierce Oil Corp., Fort Worth	10,000	SD
Panhandle Ref. Co., Wichita Falls	4,500	2,300
Associated P. & R. Corp., Ft. Worth	2,000	SD
Primrose Ref. Co., Wichita Falls	1,500	200
Interstate Ref. Co., Ranger	2,500	SD
Haggeman Ref. Co., Tiffin	2,000	350
Star Ref. Co., Ft. Worth	1,500	350
State Ref. Co., Dallas	1,000	SD
Sunshine State Ref. Co., Wichita Falls	2,500	1,850
Tidal Western Ref. Co., Burkburnett	3,000	1,750
Texas Company, Dallas	15,000	7,600
Texas Prod. Ref. Co., Waxahachie	2,000	SD
Texhoma O. & R. Co., Wichita Falls	4,500	3,400
Tiger Oil & Ref. Co., Breckenridge	1,500	160
Transcontinental O. Co., Ft. Worth	5,000	1,580
Travis Ref. Co., Burkburnett	1,000	250
Great Texas Ref. Co., De Leon	700	80
Uniform Pet. Co., Burkburnett	4,000	SD
Virginia Ref. Co., Dublin	4,000	SD
Victor Ref. Co., Burkburnett	2,000	SD
Wagoner Ref. Co., Electra	2,200	2,600
Walker Cons. Ref. Co., Iowa Park	2,500	SD
White Eagle O. & R. Co., Ft. Worth	5,000	2,700
Waco Ref. Co., Waco	5,000	SD
Worthan Ref. Co., Worthan	400	SD
World Ref. Co., Bridgeport	800	SD
Texas total	178,200	

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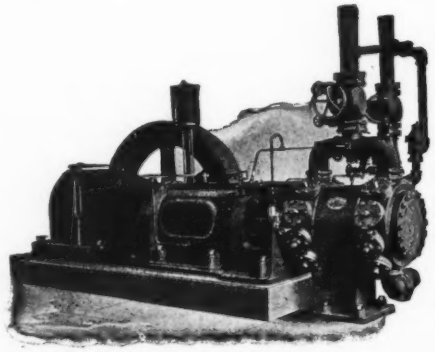


Modern Equipment Increases Gasoline Yield

Building new ones and improving operation of old natural gasoline plants in Texas

By H. H. King

Fort Worth, Texas.—The growth of the natural gasoline manufacturing industry in Texas in the past three years has won for the state a position among the foremost in the country in production of natural gasolines, and is becoming an important factor in helping to meet the Nation's steadily increasing demand for motor fuels. Shipments of natural gasoline made from the various plants scattered over North and Central West Texas fields during the first ten months of this year amount to approximately 150,483,588 gallons. This quantity has already been distributed via tank cars to various sections of the country, including large shipments to refineries on the Atlantic and Gulf Coasts, to be blended with naphtha and sold as motor fuels, or to improve the quality of straight run gasoline.

The investment in natural gasoline manufacturing plants in Texas has increased to a total of approximately $20,000,000 in recent months as result of new plants of the larger type having been contracted for by the Chestnut & Smith Interests, Lone Star Gas Company, Humble Oil & Refining Company, Gulf Production Company and Magnolia Petroleum Company. There are a total of 124 plants in the state, and their combined facilities for charging gas is estimated at 700,000,000 cubic feet daily. A number of the older plants included in this total are over-built as result of natural depletion of the gas production in surrounding fields and inability to obtain additional connections, but since the gasoline recovery increases as the gas pressure in old wells recedes, the output of these plants has not been materially affected. The plants are largely centered around the high gravity oil producing areas in Wichita, Eastland, Stephens and Young Counties, and are gaining in numbers as additional gas production can be contracted for, while some of the plants are be being reduced in size, or moved to other lacations for lack of gas. The Corsicana-Powell field in Navarro County is the newest field in the state to be invaded by the natural gasoline industry, and at present Humble is erecting an absorption plant at an estimated cost of $250,000, with the expectations of obtaining a recovery of two gallons of gasoline per thousand cubic feet of gas.

During the first 10 months of this year the shipments of natural gasoline from plants in Texas maintained an average of 15,084,359 gallons per month, but fluctuated from month to month due to reactions in the refined petroleum market over the entire country. The month of July furnished the heaviest shipments, having been credited with a total of 17,289,216 gallons, while the movement of natural gasoline stocks from plants during the short month of February amounted to only 12,549,600 gallons. The heavy shipments during July were the highest in the history of the state, and were made at a big sacrifice in prices at the expense of plant owners, who were caught with all storage filled as result of the failure of an anticipated early summer demand for natural gasoline to materialize during May and June. Shipments during October proved to be the second highest for the year, having amounted to 16,930,284 gallons, and was largely due to increased production from new plants in Eastland and Stephens Counties.

Modern Equipment Increasing Yield

Upon the completion of new plants now under construction and improvements to old plants in Central West Texas, the output of the state will be greatly augmented, while the adoption of more modern equipment is increasing the gasoline yield from month to month. The Ranger, Eastland and Pioneer fields in Eastland County are generally spoken of as one district, and are producing more natural gasoline daily than any other district in the state, while Stephens County ranks second. The gasoline yield from gas in Stephens County will hardly average a gallon and a half per 1000 cubic feet of gas, but this is offset by a tremendous volume of gas and extra large facilities to handle same. The Burkburnett field in Wichita County is the third largest gasoline producing area in the state, and has a very limited gas production, but the gasoline yield from this gas is the greatest known of in the state, amounting to more than 15 gallons per 1000 cubic feet in a few wells.

Shipments of natural gasoline from the various manufacturing centers in Texas from January to October, inclusive, are shown below in barrels:

Fields—	January	February	March	April	May	June	July	August	Sept.	October	Totals
Ranger - Eastland - Pioneer	66,940	76,160	88,575	102,852	99,260	62,610	123,850	98,750	95,078	105,075	919,150
Stephens County	74,000	67,320	78,420	85,300	84,173	91,780	103,527	103,380	101,935	105,923	895,758
Burkburnett	90,030	73,570	90,988	84,630	88,595	77,040	73,595	72,110	67,690	69,473	787,721
Desdemona-Gorman	61,425	55,615	59,642	64,333	64,875	65,040	84,364	85,614	75,475	77,331	687,714
Electra	14,130	12,779	15,756	14,399	13,422	13,760	13,937	17,025	16,605	18,486	149,699
Young County	2,570	2,700	2,355	3,739	3,800	8,719	8,175	10,660	11,785	10,568	65,071
Petrolia	6,370	10,656	4,520	5,280	4,819	4,320	4,800	7,820	4,800	5,041	58,426
Ibex-Shackelford County	.....	.....	.....	.....	.....	.....	.....	6,715	10,055	11,205	27,975
Totals in barrels	315,465	298,800	334,256	360,533	358,944	323,269	411,648	402,074	383,423	403,102	3,591,514

W. P. R. A. Recommends Change in Freight Rates

Tulsa, Okla.—The Western Petroleum Refiners Association has recommended to refiners all over the country a drastic readjustment of freight rates on petroleum and its products that would cover the entire nation, according to P. A. Conway, commerce counsel and traffic manager of the association.

This extensive rate program of the association now is being put before refiners everywhere through the medium of a questionnaire which seeks to ascertain the views of the various refining interests as to the rate proposal.

Midwest Completing New Unit for Wyoming Plant

Casper, Wyo.—The Midwest Refining Company is completing a new unit to the company's absorption plant in the Salt Creek field in Wyoming. The addition to the Midwest plant makes it one of the largest in the country and one of the most modern and well equipped.

The E. T. Williams Oil Company is operating a natural gasoline plant in the western part of the Salt Creek field.

El Dorado, Ark.—The H. H. Cross Refining Company plans to begin operations at its refinery at Smackover in this state about December 1.

Natural Gasoline Now a Factor in Motor Fuel

Washington, D. C.—In addition to some 5,098,056,700 gallons of gasoline produced in 1921, some 473,658,500 gallons were produced from natural gas. This makes natural gasoline a factor in the recent over production of gasoline in this country.

Production of 6,202,234,613 gallons of gasoline in 1922 was the output of refineries only and did not include something like 500,000,000 gallons of natural gasoline. This gives a total of approximately 6,700,000,000 gallons, which exceeded the 1922 domestic consumption and exports by about 739,000,000 gallons.

Prior to 1904 natural gasoline, which was first produced at Titusville, Pennsylvania, was wasted. Beginning with the initial output of 4000 gallons from one small plant in that year, the output increased to 7,426,000 gallons from 2,476,000,000 cubic feet of natural gas in 1911 and to 383,000,000 gallons from 496,000,000,000 cubic feet in 1920. The 473,658,500 gallons produced in 1921 were valued at $55,717,900.

It is estimated that at least 2,500,000,000 gallons of gasoline or twice the amount recovered from natural gas since 1904, has been wasted. The principal loss occurs through failure to recover and treat all of the casinghead gas which is produced along with oil.

Pittsburgh, Pa.—Installation of equipment now is under way at the Pittsburgh plant of the Chesebrough Manufacturing Company, makers of vaseline and other petroleum derivatives, which is located in Stowe township. The plant will be composed of three buildings.

WIRE AKIN

for

CASINGHEAD and ABSORPTION GASOLINE

Swift Shipments from

OKLAHOMA

TEXAS LOUISIANA

We make and market all grades of natural gasoline. You can get what you want, right on the dot, when you entrust your order to Akin.

THE AKIN GASOLINE CO.

Exchange National Bank Building

TULSA :—: :—: OKLAHOMA

Chestnut & Smith Buys Gasoline Plant in Texas

Fort Worth, Texas.—The properties of the Central Gasoline Producing Company, including a completed natural gasoline plant in Stephens County, Texas, were purchased by the Chestnut and Smith interests of Tulsa for $205,000 when sold by auction here November 30 by order of the United States Court for the North Texas district. The properties were thrown into receivership last summer, and George P. Gleason has been serving as receiver, while in the meantime the plant was kept in operation continuously. Only two bids were submitted for the properties, and the losing bid was for $201,000, having been made by the Roeser and Pendleton Gasoline Company.

The plant is equipped with the absorption process, having a capacity of about 15,000,000 cubic feet of gas daily, and represents an actual investment of $317,000. It is located on the W. P. Newell lease, section 1025, and is to be enlarged by the new owners, who have announced that J. M. Holloway will remain in charge of the plant with the same force of workmen.

Calorizing Company Will Sell Hybnickel Exclusively

Pittsburgh, Pa.—Announcement has been made that The Calorizing Company, Pittsburgh, has acquired exclusive sales rights for Hybnickel, the heat enduring alloy perfected by Victor Hybinette. The arrangements which make this announcement possible provide a single source for all that has been developed by the Calorizing Company and Mr. Hybinette working independently. In addition, the production facilities of both organizations will be preserved.

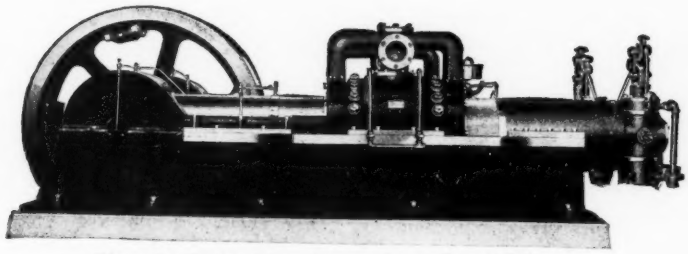
Kansas City, Kans.—The Kaw Boiler Works Company has opened a branch sales office at Tulsa, Oklahoma, to better serve the company's growing trade in the Mid-Continent refining field. The Tulsa office is located at 214 Tuloma building.

Casper, Wyo.—Operation will begin shortly on the natural gasoline plant of the Ohio Oil Company located in the southern part of the Salt Creek field in Wyoming. Lines from the wells are now being laid to the plant.

To Reduce North Texas Refined Freight Rates

Wichita Falls, Texas.—The freight rate on refined petroleum products from Wichita Falls to Burkburnett refining centers to New Orleans and other Louisiana ports is to be reduced shortly from 24½ to 20½ cents per hundred, according ot a joint announcement made by the Missouri, Kansas & Texas railroad and the Louisiana Railway & Navigation Company. Although the date has not been definitely settled as to when the new tariff will become effective, the North Texas refiners have been assured that it will be published in the near future. The granting of this reduced rate will equalize the tariff now in effect on shipments to Texas ports and Louisiana ports, as the freight rate from North Texas refining centers to Texas ports has been 20½ cents for some time.

THE NEW ENCLOSED TYPE



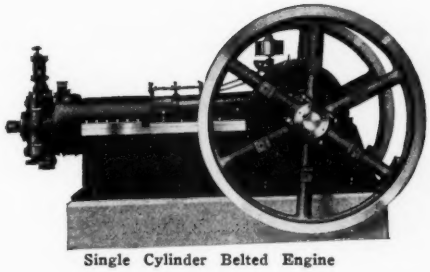
Direct Gas Engine Driven Vacuum Pump, Two Cylinder

Watts-Miller Gas Engines and Direct Gas Engine Driven Compressors and Vacuum Pumps

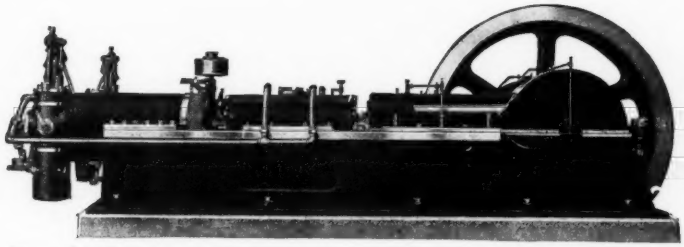
Pat. June 22, 1897; Oct. 6, 1914; April 13, 1915

High Efficiency Gas Engines, Compressors, and Vacuum Pumps for Power Plant Equipment

Sizes from 50 to 400 h. p.



Single Cylinder Belted Engine



Direct Gas Engine Driven Compressor, Two Cylinder, Single or Two Stage

Compressors particularly adapted to casing-head gasoline plants, gas pumping plants, and compressed air installations, in single and 2-stage machines to operate on practically all intake and discharge pressures. Continuous circulating filtering automatic oiling system.

The Miller Improved Gas Engine Co.

SPRINGFIELD, OHIO

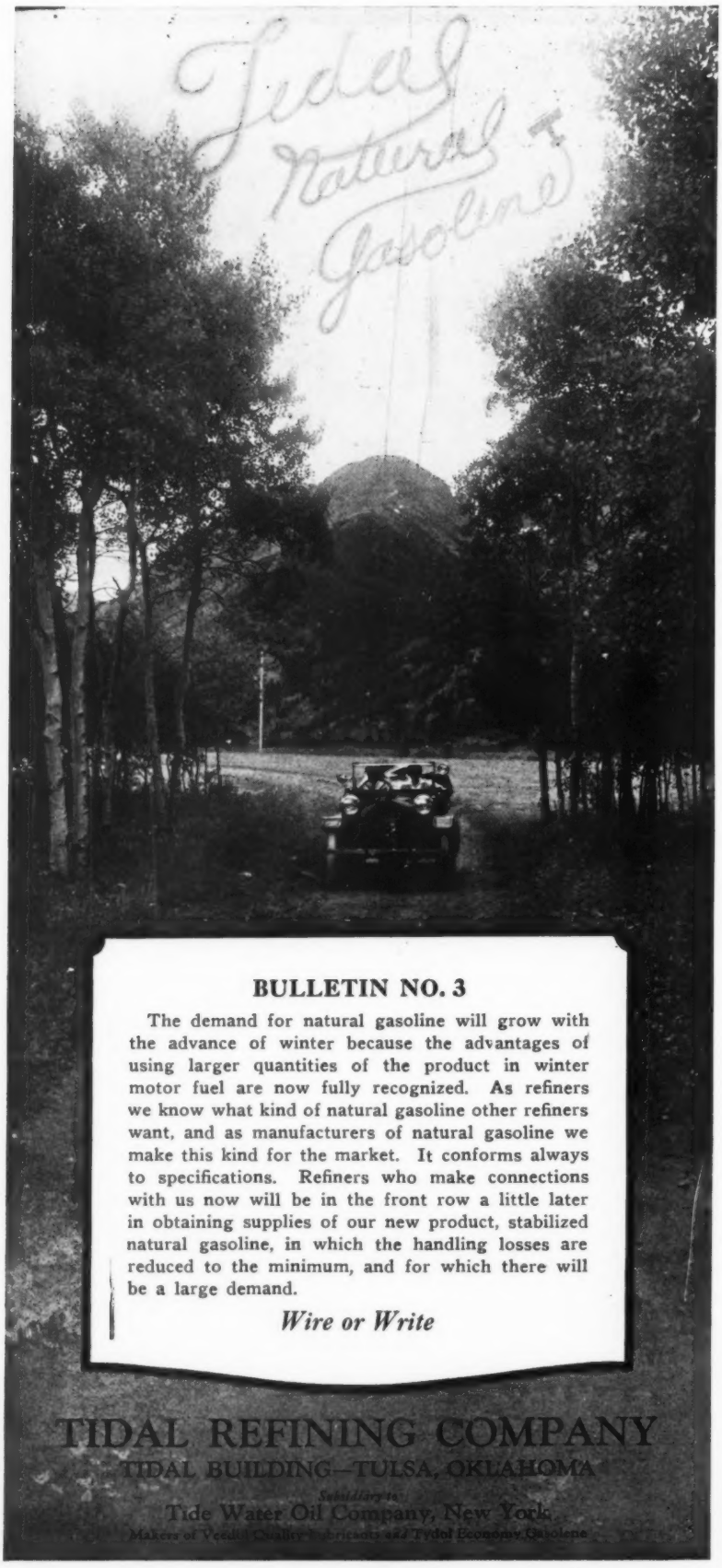
WESTERN DISTRIBUTORS

C. E. Ingalls,
Rialto Building,
San Francisco, Calif.

Miller Improved Gas Engine Co.,
Branch Sales Office, also Warehouse and Service,
323 North Cheyenne Ave., Tulsa, Oklahoma

Frick-Reid Supply Co.,
Casper, Wyoming

Tell them where you saw the ad



BULLETIN NO. 3

The demand for natural gasoline will grow with the advance of winter because the advantages of using larger quantities of the product in winter motor fuel are now fully recognized. As refiners we know what kind of natural gasoline other refiners want, and as manufacturers of natural gasoline we make this kind for the market. It conforms always to specifications. Refiners who make connections with us now will be in the front row a little later in obtaining supplies of our new product, stabilized natural gasoline, in which the handling losses are reduced to the minimum, and for which there will be a large demand.

Wire or Write

TIDAL REFINING COMPANY

TIDAL BUILDING—TULSA, OKLAHOMA

Subsidiary to

Tide Water Oil Company, New York

Makers of Veedol Quality Lubricants and Tydol Economy Gasolene

Arab Starts Operating Second Gasoline Plant

Eastland, Texas—The Arab Gasoline Corporation of Philadelphia, Pennsylvania, has placed in operation its second natural gasoline manufacturing plant to be erected in Eastland County section of Central West Texas. This plant is equipped to handle 11,000,000 cubic feet of gas daily, and the gasoline recovery is expected to amount to between 14,000 and 15,000 gallons daily. The plant represents an investment of approximately $500,000, and is located on the A. Hise tract, about five miles north of Eastland. The residue gas from this plant has been contracted for by the Lone Star Gas Company. The Arab Corporation maintains an office in Eastland, with Horace Butler, general manager in charge, while Alex Clarke is chief engineer for the two plants now being operated. Frank Dwyer has been made superintendent of the new plant.

Dallas, Texas.—The State Refining Company, which has an 1800 barrel daily capacity skimming plant at Grand Prairie, near Dallas, was placed in receivership November 10, with J. H. Hill and Lee I. Starling acting as joint receivers. The Texas Pipe Line Company is reported to be one of the principal creditors.

St. Louis, Mo.—In a report of Grant Foreman, special master appointed in federal court, it is held that the Indiahoma Refining Company, a $5,000,000 concern, does not require a receiver to adjust its financial affairs. The company is solvent, the special master reported.

Tulsa, Okla.—The Refinery Supply Company of this city has recently issued a new catalog, being their No. 14. The catalog is replete with illustrations and descriptive matter anent the products carried in stock. The Refinery Supply Company probably carries the largest stock of refinery equipment in the Mid-Continent territory.

New York, N. Y.—Officials of the Standard Oil Company (New Jersey) have denied reports that the company was seeking to gain control of Tide Water Oil Company.

Ardmore, Okla.—The Westheimer-Daube interests have purchased the refinery and equipment of the Bay State Refining Company at Healdton, Oklahoma, for $30,000 cash. The plant was sold at receiver's sale.

K. C. Structural Has New Refinery Catalog

Kansas City, Kans.—A new catalog on oil tank and refinery equipment has been issued by the Kansas City Structural Steel Company of this place, according to J. A. Vance, sales manager. The catalog is well illustrated and is attractive in make-up as well as interesting as to contents.

The Kansas City Structural Steel Company maintains a modern plant at Kansas City, Kansas, and has built up a good business in the oil tank and refinery equipment line, not only in the Mid-Continent field but elsewhere.

The day you start operating the Dubbs Cracking Process, you can turn the tide, from limping along at a loss, if you are operating at a loss, to running swiftly and surely at a bigger profit than you probably ever thought possible

The difference will be in the cost of your gasoline, to the extent of the difference between the cost of 35/40 gravity crude delivered in your refinery and the cost of your own refinery fuel oil, assuming that the 35/40 gravity crude will yield as much gasoline by skimming as fuel oil now does when run direct to the Dubbs Cracking Process and without pre-distillation or pre-treatment

The cost of cracking by the Dubbs Process is no more than the average cost of skimming

Universal Oil Products Company
Owners of the Dubbs Process
208 South La Salle Street Chicago

Get

Your Copy

of This New

"UNITED" FITTING CATALOG

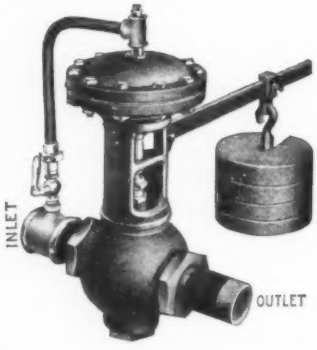
Every oil producing and refining company should have a copy of this NEW BIG VALUABLE Loose-Leaf Catalog. Besides showing a complete line of Fittings and Oil Producing and Refining Equipment manufactured by this company, it also contains much valuable information for the oil industry and its related branches.

Write today for your copy of this valuable catalog.
It will be promptly sent, without obligation.

UNITED IRON WORKS, Inc.

TULSA KANSAS CITY, MO. DALLAS

"UNITED" IRON WORKS INC. FOR SERVICE



The Fulton Vacuum Regulator

Maintains a fixed vacuum in a well when desired.

Can be used either as a vacuum regulator or a back pressure regulator by merely changing the position of the lever.

As a vacuum regulator will close when vacuum in the well rises to a given point.

The Chaplin-Fulton Mfg. Co.

30 Penn Ave., Pittsburgh, Pa.

Industry Overlooking $1,000,000,000 Market

(Continued from page 23)

tire expenditures for all purposes by the oil industry in the sixty odd years of its existence.

The biggest thing now on the horizon is the use of oil for household heating. This has been brought about not only without the help of the oil industry but in many cases against the opposition of the oil industry and yet thousands of homes are already being heated by oil, and the fuel used for domestic purposes throughout the country would on an energy basis be almost equivalent to our entire production of oil at this time.

Clubs are being formed in the various cities by the men engaged in producing the apparatus used for household heating and I predict that before March 1st of next year these clubs will have a membership in excess of the membership of the American Petroleum Institute.

There has been no time for several years that this field for the utilization of oil was not open to the oil companies, and yet the oil companies have been the hardest to convince that people could afford to buy oil for heating their homes. Every oil man seems to want to compare the cost of oil with the cost of coal. Coal at best is far from satisfactory for house heating, but the cost of coal is only one of the items of expense that the householder must pay and often the care of his furnace and the removal of his ash amounts to much more than the cost of his coal, and these items are saved if he uses oil.

We are going to have a number of papers relating to the utilization of oil. I believe this subject is of greater importance to us than any other subject other than the matter of the control of production. The matter of control of production hits every feature of our business; in fact we cannot ever develop the proper utilization of oil until we can control production. We will never be able to realize ultimate sales, secure preference for oil over other fuels and have satisfied customers and the confidence of the public until we can stabilize oil supplies and prices.

The program I have been recommending for some time is this:

(1) That we make such changes in the basic methods of producing crude oil that the raw product will be located in vast quantities and blocked out in large amounts so as to be readily accessible and under conditions whereby it will not have to be forced upon the market in excess of what the market can absorb.

(2) That we stimulate every oil company to develop all possible demonstrated applications for the utilization of oil.

(3) That we give support, encouragement and assistance to inventors and manufacturers of all oil burning apparatus.

(4) That the industry as a whole shall contribute and co-operate to develop such uses for oil as the individual companies for competitive reasons are not warranted in doing.

If this program appeals to you I hope you will give it your enthusiastic endorsement and your determined support. Results can only be secured by the oil industry by every man in the oil industry contributing his share. The man who contributes nothing to this work is not simply an idler but a brake on the wheels of progress.

natural gasoline

grade "a"

GRAVITY.....Not below 72° Be.
Not above 78° Be.
E. P.....Not over 375° F.
RECOVERY.....Not less than 90%

grade "b"

GRAVITY.....Not below 76° Be.
Not above 82° Be.
E. P.....Not over 375° F.
RECOVERY.....Not less than 85%

grade "c"

GRAVITY.....Not below 80° Be.
Not above 88° Be.
E. P.....Not above 350° F.
RECOVERY.....Not less than 78%

grade "d"

GRAVITY.....Not below 88° Be.
Not above 92° Be.
E. P.....Not above 350° F.

THE most active and powerful thing in the universe is the infinitesimal particle called the "electron." It is the source of all action and power. The NATURAL GASOLINE constituent of motor fuel is strikingly akin thereto.

If you want power, action, economy and a quick start in your motor on a cold winter's morning add plenty of NATURAL GASOLINE to your motor fuel.

Chestnut & Smith Corporation have large manufacturing, storing and shipping facilities, and can supply your NATURAL GASOLINE requirements promptly in carload or trainload lots at 'most any time.

We shall appreciate the opportunity of quoting you. Be sure and get in touch with us at all times before buying NATURAL GASOLINE.

C&S CORPORATION

grade "1"

GRAVITY.....Not below 58° Be.
Not above 62° Be.
E. P.....Not over 437° F.
RECOVERY.....Not less than 91%

grade "2"

GRAVITY.....Not below 58° Be.
Not above 62° Be.
E. P.....Not over 450° F.
RECOVERY.....Not less than 90%

grade "3"

GRAVITY.....Not below 64° Be.
Not above 66° Be.
E. P.....Not over 440° F.
RECOVERY.....Not less than 88%

grade "4"

GRAVITY.....Not under 66° Be.
Not over 70° Be.
E. P.....Not over 435° F.
RECOVERY.....Not less than 82%

CHESTNUT & SMITH CORPORATION

GENERAL OFFICES - CHESTNUT SMITH BLDG. - TULSA OKLA.

Tell them where you saw the ad

÷ REFINERY SUPPLIES ÷

Refiners' Supplies

	Dec. 15
Soda Ash light 58% ..... cwt.	$1.38–1.50
Silicate of Sola 60 deg. bbls..... cwt.	1.70
Sal Soda wks ..... cwt.	1.10–1.30
Caustic Soda 76% ..... cwt.	3.10–3.25
Chloride of Lime solid ..... cwt.	1.25–1.35
Sulphuric Acid 60 deg. tank cars f. o. b. shipping point....per ton	9.00–11.00
Benzol—	
Pure Water White .....Tanks....gal	.23 —.28
Drum...gal.	.28 —.33
90% .....Tanks...gal	.21 —.26
Drums...gal	.26 —.31

Jobbers' Supplies

Vegetable Oils—		
*Linseed, carloads Spot.....gal.		—.92
Nov.-Dec. . . ..gal.		—.90
Less carload Spot .....gal.		—.95
5 bbls. or less Spot .....gal.		—.98
Boiled, tank Spot .....gal.		—.88
Boiled, carloads Spot .....gal.		—.94
Soya Bean Spot, Tanks .....lb.		—.10¾
Animal Oils—		
English Degras .....lb.	$	—.04¾
Domestic Degras, bbls., carloads ..lb.		—.03¾
Horse .....lb.		—.07½
Oleic Acids—		
Dist . . ..lb.		—.08½
Saponified . . ..lb.		—.08½

Lard Oils—		
Prime		
Winter		
Strained .. 1 to 1½ ffa. 40/45c. t. lb.	$	.16¾
Extra		
Winter		
Strained . 2 to 4½ ffa. 40/45c. t. lb.		.13¾
Extra.....4 to 5 ffa. 40/45c. t. lb.		.12¾
Extra No. 1....7 to 10 ffa. 40/50c. t. lb.		.11
Extra No. 1.....7 to 10 ffa. 40/50c t. lb.		.10½
No. 2 .....22 to 23 ffa. 40/45c. t. lb.		.10
Prime Edible Tallow under 1½ ffa. 40/45c t. N. Y. .....lb		.09½
Tallow acidless . .....lb.		11½
Lard Stearine .....lb.		.15½
Oleo Stearine . .....lb.		11
Neatsfoot Oil—		
Pure . .....bbls.-lb.		.14¼
Extra . . ..bbls.-lb.		11
No. 1 .....bbls.-lb.		10½
Cold pressed . .....lb		.17
Fish Oils—.		
Menhaden Oil		
Light pressed . .....gal.	$	—.65
White . . ..gal.		—.70
Yellow bleached . .....gal.		—.68
*Herring, tankcars coast .....gal.		—.40
Whale, extra winter bleached ....gal.		—.81
Seal		Nominal
Naval Stores—		
Turpentine, N. Y. .....gal.		.93
Turpentine† . . ..gal.		86½
Rosin B. N. Y. .....Bbl.		5.60
Rosin, F. N. Y. .....Bbl.		5.60
Rosin B.† .....Bbl		4.22½
Rosin F.† . .....Bbl.		4.22½
Rosin Oil 1st run .....gal.		.43
Rosin Oil 2nd run . .....gal.		.46
Pine Tar—		
Kiln Burnt . .....Bbl.		11.00
Retort . .....Bbl.		11.00

*Nominal
†Savannah, Ga., market.

CHARLES BOND BOOKLET

Booklet "F" is the latest printed matter from the offices of Charles Bond Company, Philadelpha, concern Grundy Flexible Insulated couplings and the Mather Flexible coupling.

This booklet also gives some testimonials from users of the two products. A page is provided for giving giving the manufacturer information as to the proposed use, when asking for details on either of the products.

Copies of the booklet may be had by writing the manufacturing concern, 607-19 Arch street, Philadelphia.

Little Rock, Ark. — The Arkansas gasoline test act, which has been attacked by refining companies in the state, has been amended by senate bill No. 55 passed at the recent session of the general assembly.

The Reeves Vertical Gas Engine-Compressors for Gas Booster Plants

A few of the reasons why leading companies and engineers are purchasing the Reeves Gas Engines and Compressors.

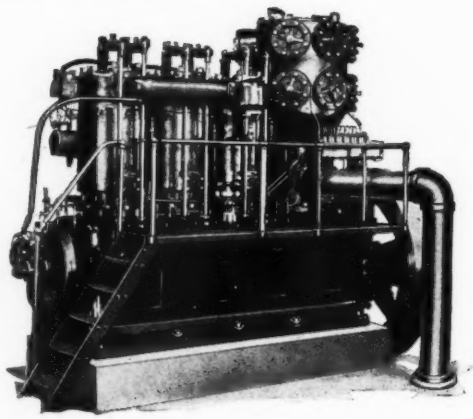
They know the Reeves unit is not an experiment, having proven its reliability and worth over a period of about twenty years successful service.

Account of the simplicity of operation; low fuel and maintenance cost per horse power. One user just reported having operated last four units 16 months without shutdown.

All Compressors equipped with "Hope" Biplane, Patented, easy operating, high speed Valves.

Saving in installation time partly pays for unit.

Saving in plant construction cost from 20 to 50 per cent depending on location.



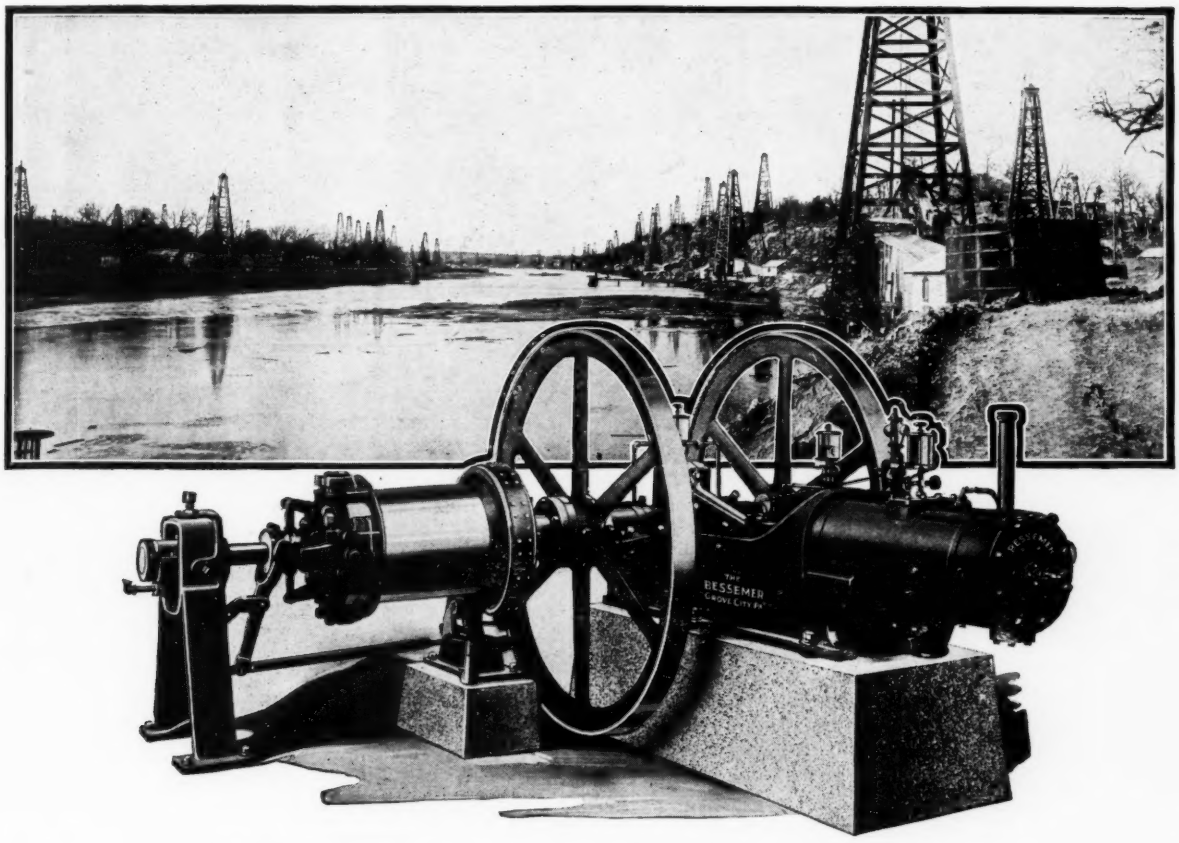
Engine Sizes:
40 H. P. up to 250 H. P.

Engine-Compressor Sizes:
60 H. P. up to 160 H. P.

Consulting and Contracting Engineers in Natural Gas and Oil.

HOPE ENGINEERING & SUPPLY CO.
Mt. Vernon, Ohio, U.S.A.

Branches Pittsburgh, Penna. Tulsa, Okla. Casper, Wyo.



Not "*too many triggers*"

We asked the Superintendent of Production of a company which is one of the largest buyers of Bessemer Engines just why he chose the Bessemer.

His answer was brief and to the point.

"It hasn't too many triggers."

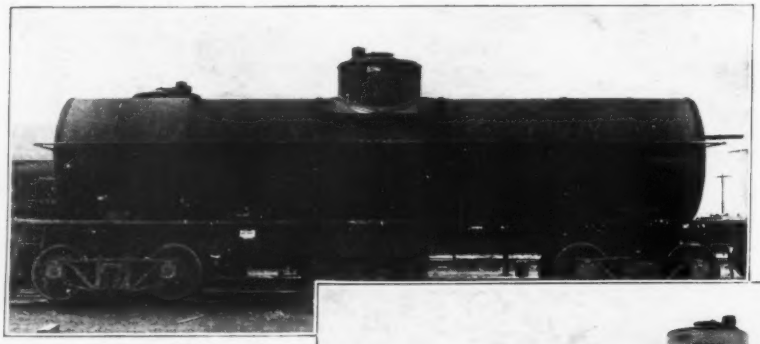
Then he went on to say that long experience had exclusively proved to them that Bessemers, because of their simplicity, meet oil-field conditions better than any other engine they had tried—"and we've tried them all."

It doesn't take an expert to make a Bessemer operate—dependable performance *is built into them.* Buy performance—not "triggers"—buy Bessemers.

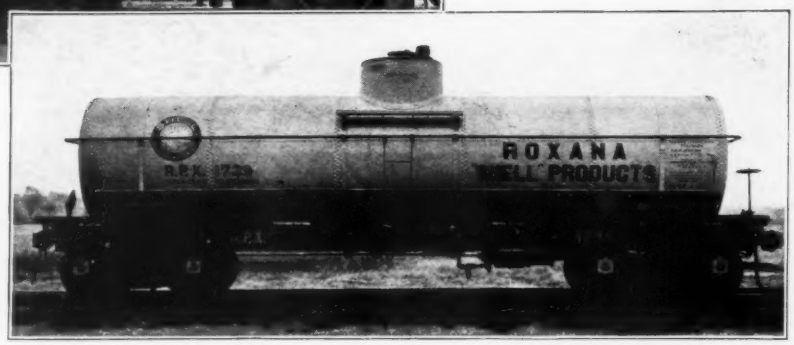
THE BESSEMER GAS ENGINE COMPANY
18 York Street Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS VACUUM PUMPS – ROLLER PUMPING POWERS



Owners Name Withheld by Request



Courtesy Roxana Petroleum Co.

Are Your Tank Cars a Boost or a Knock?

Well maintained and good appearing equipment is of inestimable value to your company and its products from an advertising standpoint.

A well painted tank car is equal to two bulletin boards in every town that the car goes through and every crossing that it passes.

Proper painting operations reduce cost of maintenance and protect investment in addition to keeping cars in service.

DEGRACO TANK CAR PAINTS have long been a standard with car owners who demand real service with good appearance.

At your service for better painting.

Degraco Products

- Tank Paints
- Head Liner Enamels
- Tank Car Paints
- Pipe Line and Station Finishes
- Superior Graphite Paint
- Sta-White
- Degraco Paints for Houses
- Degraco-Tone

For Particulars and Color Suggestions Write

Detroit Graphite Company

592 Twelfth St., Detroit, Mich.

NEW YORK
PHILADELPHIA
ATLANTA
NEW ORLEANS
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ST. LOUIS
TULSA
SAN FRANCISCO
CLEVELAND

***DEGRACO PAINTS** are sold through branch offices with warehouse stocks in all principal cities.*
Manufactured in Canada by Dominion Paint Works, Ltd., Walkerville, Canada.

DEGRACO PAINTS VARNISHES ENAMELS
All Colors for All Purposes

Name.....
Position.....
Company Name.....
Address.....
State.....

Detroit Graphite Co.
Detroit, Mich.